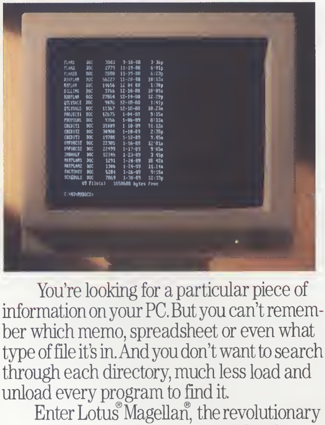
FEBRUARY 1990 $3.00

LOTUS

COMPUTING FOR MANAGERS AND PROFESSIONALS

HOW TO LINK FILES IN RELEASE 3

Do they call it a hard disk because it's so hard to find what you're looking for?



You're looking for a particular piece of information on your PC. But you can't remember which memo, spreadsheet or even what type of file it's in. And you don't want to search through each directory, much less load and unload every program to find it.

Enter Lotus® Magellan®, the revolutionary new software product that provides the quickest, easiest way to find all the information kept on a PC.

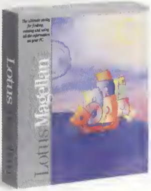
Magellan is the first utility that lets you instantly see the complete contents of all your files, without having to take the time to load the applications first.

In seconds you can perform a search on a phrase, a topic, an idea or even an entire file. Not just key words.

And once a file is found, you can launch directly into the application in a single keystroke. It's all loaded and ready to go.

Magellan is designed for every level of PC user. And it works with the leading DOS application software programs you already use.

Call 1-800-345-1043 for a free Magellan demo kit. Ask for DBH-3593. And spend your time working with information, instead of looking for it on your PC.


The ultimate utility for finding, viewing and using all the information on your PC.
Lotus
Lotus Magellan

Lotus Magellan

© 1989 Lotus Development Corporation. Lotus and Magellan are registered trademarks of Lotus Development Corporation.

LOTUS

76 *Prepare and compare your budgets.*

96 Windows *still a boost to DOS*

90 *Products: new portables and more*

FEATURES

34 HERE'S THE MISSING LINK
Multiple-file applications in Release 3 let you permanently connect data in one file with data in another.
BY DAVID J. BOOKBINDER

40 ORDER ENTRY MADE SIMPLE
Streamline the mechanics of keyboarding information from printed order forms.
BY E. MICHAEL LUNSFORD

48 TESTING CHOICES IN A HURRY
A data table lets you see the impact of many different values in a formula.
BY LARRY ROSHFELD

54 CHART YOUR PROCESS FLOW
To find areas for improvement in a business system, create a visual model using *1-2-3* or *Symphony* and your printer.
BY RICHARD CRANFORD

63 HOW TO WIN WITH FINANCIAL LEVERAGE
Here's a way to assess the leverage impact of preferred stock or debt.
BY STEPHEN L. NELSON

2 STAFF LETTER

3 LETTERS

6 IDEAS & TRENDS
Electronic Mail
Also: 80386SXs, VDT Radiation, Interview with Marty Fahey, Shorts

16 @LOTUS

18 START HERE
Enhanced Graphs
BY DANIEL GASTEIGER

MACROS

24 1-2-3 MACROS
Alphabetical Disorder
BY WILLY VANHAELEN

28 FOR DEVELOPERS
A Step Up for Power Users
BY JEFFREY KAHN

32 MACRO BASICS
Macros Can Make Decisions
BY DANIEL GASTEIGER

RESOURCES

68 Q&A

72 GOOD IDEAS

REVIEWS

76 Four Budget Assistants: *The Budget Express, Budget Solutions, @Ease, Master Planner*
BY TOM CARLTON AND R. MARTIN TEMPLE

81 A New Leader Among *1-2-3* Compilers: *Baler 5.0*
BY BILL LAWRENCE

86 Three Personal Income Tax Templates for *1-2-3*: *TaxTime, TaxEase, Lotax*
BY CAROLINE HALLIDAY

80 ADVERTISER INDEX

80 EDITORIAL EVALUATION

80 READER SERVICE CARD

90 NEW PRODUCTS
Compaq LTE and LTE/286, and more

96 ESSAY
Windows Has a Bright Future
BY CAROLE PATTON

COVER: LOU JONES

LOTUS

Editorial Director
John B. Campbell

Managing Editor
Eleanor McCarthy

Senior Editors
Justin Fielding
Rich Friedman
Dick Ridington

Art Director
Cynthia Davis
Associate Art Director
Jill Winitzer
Assistant Art Director
Jill Thompson
Production Editor
Kathy Minnix

Assistant Managing Editor
Arlene G. Richman

Associate Editors
Applications, Richard Cranford
Techniques, Phyllis A. Sharon

Macros Editor
Nicholas Delonas

Technical Editor
Carrie Thomas

Contributing Editors
Daniel Gasteiger
Stephen L. Nelson

Assistant Editors
Ideas & Trends, Jennifer Smith
Resources, Sue Ellen Hendershot,
Mark Scapicchio
Technical, Kelly Conatser,
Cynthia G. Fitzgerald, Carol White

Copy Editors
Katherine Koerner
Ann M. Kremers
Assistant Copy Editor
Nancy Robertson
Research Editor
Phyliss L. Greenberg
Assistant Production Editor
Alice H. Mangum
Administrative Manager
Claudia Basso
Editorial Assistant
Melissa Kaplan

Publisher
Mark D. Flanagan
Executive Administrator
Catherine J. Congleton

Associate Publisher/Sales Director
Robert P. Pavone
Inside Sales Manager
Cathleen A. Cavanaugh
Inside Sales Representatives
Nancy E. Hagen
J. Todd Humphreys

Marketing Director
Robert M. Hodgson
Marketing Manager
Sydney Smyth Turner
Market Research Assistant
Ruth Hawryluk

Associate Publisher/Circulation Director
Elisabeth Folsom
Circulation Manager
Linda J. Gill
Subscription Promotion Manager
Marcy A. Geller
Subscriber Services Manager
Robyn Rineer
Circulation Assistant
Holly E. Klingel

Business Manager/Production Director
Mary Ellen Bittel
Production Assistant
Kristine Benoit

Publishing Assistant
Joan E. Swarms

Lotus Publishing Corporation
President
Mark D. Flanagan
Founder/Senior Advisor
Daniel A. McMillan

STAFF LETTER

SEND US YOUR MODELS

Part of what we do in this magazine is present spreadsheet models that can help solve real problems. If you've been a reader for a while, chances are you have adapted one or more of our models to your own purposes. Have you considered sharing one of your own models with other *LOTUS* readers?

As you've probably noticed, we have some regular contributors and they do a good job. But they can't know all areas of business, and they have no monopoly on good ideas. You may be able to fill a gap. Or you may know a better way to do something we've already done.

If so, we'd like to hear from you. And I'm going to suggest some ways to make your input most fruitful.

First, think about how broadly useful your model might be. Keep in mind that *LOTUS* subscribers are a diverse lot. Any single model will be of interest to only a fraction of the audience, but we can't afford to have that fraction be too small too often. We recently rejected a model because we couldn't see how to make it interesting to anyone who did not know the language of physical chemistry.

Second, consider the size of your model. We can and do break models into pieces so that we can fit meaningful slices of the worksheet into the width and depth of a page. But if your model is huge and hard to split into modules, try to pare it down and still keep it useful.

Third, have one or more colleagues or offsite experts review your model. When you design a model, it's easy to get so close to it that you lose sight of a key point. Before you attach your name to a model, it's best to have it exercised by someone who understands the application and by someone who is qualified to review your technical approach.

Fourth, send us a brief note, addressed to Models Editor, outlining your model and how to use it. Be specific about the problem it solves and, if you know, how it differs from previous ones aimed at the same problem. Unless your letterhead or title are self-explanatory, cite your credentials. Mention what, if any, techniques your model embodies that might be instructive even to readers who don't need such a model. Most important, ***include a disk*** containing the model. Running the model is the best way for us to understand what you're talking about.

If you're serious, it's best ***not*** to phone. Seldom can we give your idea the attention it deserves on the spur of the moment. If you write and send a disk, we can pass around your model to everyone who might have a useful response. But do include your phone number so that we can get back to you as quickly as possible. We'll try to do that within two weeks of getting your disk, though we won't always make that deadline.

If we give you a go-ahead, you'll have some work to do. We may suggest changes in the model, and we'll want you to put together a list of detailed instructions for building it. We will also want you to take a stab at writing some text that expands upon your initial note.

We're not expecting a professional piece of writing. It's our job to make you look good in print. And you'll have a chance to review the edited article before it's published.

If this is beginning to sound like a lot of work, consider this: We will pay you $1,000 or more, depending on such factors as the model's complexity and how much work we have to do. You won't get rich that way. But if you've already created the model, the money isn't bad.

John B. Campbell
Editorial Director

LOTUS (ISSN 8756-7334) is published monthly by Lotus Publishing Corporation, a subsidiary of the Lotus Development Corporation, at One Broadway, Cambridge, MA 02142. Subscription rates, one year: U.S. and U.S. possessions, $24; Canada, $28; Foreign, $100 (airmail). Please allow four to six weeks for receipt of first issue. Executive, Editorial, Circulation, and Advertising Offices: P.O. Box 9123, Cambridge, MA 02139-9123. Telephone: (617) 494-1192. ©Copyright 1990, Lotus Publishing Corporation, all rights reserved. *LOTUS* is a registered trademark. Officers of Lotus Publishing Corporation: Mark D. Flanagan, President; Thomas M. Lemberg, Secretary; Robert P. Schechter, Vice President of Finance and Operations, John W. Martin, Treasurer; Elisabeth Folsom, Vice President. Second-class postage paid at Boston, MA, and at additional mailing offices. Postmaster: Please send address changes to *LOTUS*, Subscription Dept., P.O Box 56588, Boulder, CO 80322-6588.

LETTERS

COMMUNITY COLLEGES AND COMPUTERS

"Computer Savvy in the B-Schools" [September 1989, page 60], in discussing the debate between programming and spreadsheet literacy within universities, neglected the schools at the forefront of computer literacy—community colleges.

While many four-year universities are still entrenched in obsolete methods, community colleges have led the way in developing classes in *1-2-3*, *Symphony*, and even the C language. Many classes are held at night and taught by experienced managers who put real-world applications into the learning experience.

Glen W. Spielbauer
Dallas, Tex.

WHERE'S THAT WORKSHEET?

I would like to thank you for "Where Did I Stash that Worksheet?" [September 1989, page 68] and to pass along some modifications I made to your worksheet-indexing method. By building a directory indexer, a file named 00INDEXB.WK1, in each of my worksheet directories (along with your suggested worksheet indexer), I was able to tie together and more fully automate both file-retrieval and directory-changing functions.

Each worksheet index shows 00INDEXB.WK1 as the first file name. Using only the File Retrieve command and the modified macro, it is now possible to retrieve worksheets quickly from any directory, saving keystrokes and some memory work.

Richard N. Snediker
Cherry Electrical Products Corp.
Waukegan, Ill.

Author's note: *Thank you for your suggestion, which will aid anyone who stores Lotus files in different directories.*

In order to create a file named 00INDEXB.WK1, follow the directions for creating the 00 – INDEX file, with the following exceptions:

Column A will now list directories instead of file names.

Enter /FD{filename}~ *in cell K4.*

Enter /FR~ *in cell K5 to retrieve the first worksheet listed in the directory. If your index isn't always the first file, enter* /FR00 – index~ *in cell K5 instead.*

In Symphony *enter* {SERVICES}FD{ESC}{filename}~ *in cell K4. In cell K5 replace the slash with* {SERVICES}.

When building your directory indexer, enter the full path name to each directory (for example, C:\123) to be sure the macro works correctly.

Remember to save the file before you use it. After you make sure it works, copy it to all your directories that have worksheet files.

In your worksheet-index article, the File Import Text command used in the Easy Ways to Import File Names box (step 5) returned the file information with a space instead of a period between the file name and the extension. The formula in step 6 looked for the first occurrence of a space and returned the characters in the file name only up to the space—that is, it dropped the file extension. I revised the formula in step 6 so that it returns the entire file name. I also created a macro to insert the period before the file extension. I still had to edit the spaces from each file name that had fewer than eight characters. There must be an easier way!

Charlotte S. Jerscheid
Office of Disaster Control and Civil Defense
Baltimore, Md.

Author's note: *To retrieve worksheet files in* 1-2-3 *or* Symphony, *you need only the file name. The program automatically supplies the extension. Steps 1 and 2 indicate that you should list only files with the appropriate worksheet extension for indexing. So you don't need to change the macro to include the extension.*

What a superb, handy tool for getting and keeping a handle on the worksheet Hydra. Thank you Glen! I would, however, like to suggest several modifications:

Give the listing four columns: *Name*, *Approximate Size*, *Date Created*, and *Description*. That adds useful information, and there's still enough space for a description.

Single-space the listing and limit each entry to one line to facilitate sorting it alphabetically as new files are added and deleted.

Insert a line in the retrieving macro to save the listing each time it is used to retrieve a file. That will prevent you from inadvertently losing any just-made changes in the index listing when you retrieve a file. The first line of the macro should read /FS~R. (In *Symphony*, {SERVICES} FS~Y).

Joseph E. Revell
Tigard, Oreg.

Author's note: *Thanks for your tip. I've included your idea to save the file before retrieving another file and inserted the line you suggest in cell K3, moving the rest of the macro down one row. Don't forget to reassign the macro name* (\r) *to cell K3.*

If you want to use the /File Import Text shortcut for listing the worksheet files in your directory, steps 6 through 8 won't be of much use in creating the multiple-column directory suggested here. Instead, complete step 9. You could use the Data Parse command to divide each entry into individual fields.

EARLY-RELEASE USER COMPLAINT

I am appalled at your recent decision to abandon users of vintage editions of *1-2-3*. Even though I am not one of those involved, I feel your callous decision to cease supplying information for vintage users is inexcusable.

From your editorial comment, it appears that a full 18% of your readers fall into the category to be ignored, and I don't understand how you can simply forget their existence. We buy brand-name proprietary products with the hope that we'll have the full benefits of support and information down the road. Yet you claim it's too much trouble to provide this. Maybe we should turn to the much cheaper me-too programs. At least in that market, we don't expect good support. From Lotus, we do.

Robert G. Cheron
Port Washington, N.Y.

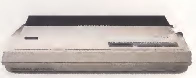
Editor's note: *Lotus Development Corp. continues to provide support to people who use old releases, as it should. And its policy should not be confused with the magazine's. We believe our decision is reasonable and in the best interest of most readers.*

Letters to the editor should be sent to Letters Editor, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123. Letters may be edited for length and clarity.*

We develop products on the premise that

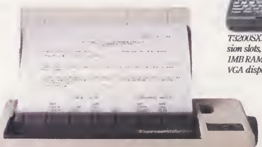
Page Laser12: 12 ppm, up to 3 paper bins, 750 sheet capability, Toshiba/Qume, Diablo, IBM & HP emulations.

T1000: 6.4 lbs, 4.77MHz 80C88, 512KB RAM expandable to 1.2MB. MS-DOS in ROM, 720KB 3½" diskette drive. Built-in RGB, parallel, serial and external drive ports.



P341SL: Wide carriage (up to 270CPL), 216/72 cps, advanced paper handling, 4 part forms.

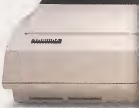
T3200SX: 17.0 lbs., 16MHz 386SX, 6 expansion slots, 5 built-in ports, 40MB hard disk, 1MB RAM expandable to 13MB, gas plasma VGA display, 1.44MB 3½" diskette drive.



ExpressWriter 301: 4 lbs, letter-quality 24-dot print head, 60 cps, Toshiba/Qume and Epson LQ emulations, 5 resident fonts.

T3100e: 12MHz 80286, internal IBM slot, 40MB hard disk, gas plasma display, 1MB RAM expands to 5MB, 1.44MB 3½" diskette drive.

T5100: 16MHz 80386 microprocessor, 100MB hard disk, 2MB RAM expandable to 4MB. 14.6 lbs. Built-in EGA display with high resolution gas plasma screen.



P351SX: 360/120 cps, 24-pin letter quality, color option, Toshiba/Qume and IBM emulations standard, Epson & Diablo emulations optional.

great minds don't think alike.

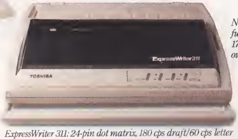
T1600: 11.6 lbs, Battery-powered 12MHz 286, 20MB or 40MB hard disk, 1.44MB floppy. 1MB RAM expands to 5MB, backlit EGA LCD, removable/rechargeable battery packs.

T5200: 20MHz 80386 processor, 2 internal IBM compatible expansion slots, 40 or 100MB hard disk, VGA display with external VGA monitor port, 2MB RAM expandable to 8MB.

© 1989 Toshiba America Computer Systems Division

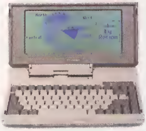
T3200: 12MHz 286, 2 IBM compatible slots. 40MB hard disk, 1.44MB floppy, 1MB RAM expands to 4MB, EGA screen.

PageLaser6: 6 ppm. 512KB standard memory. Emulations: HP LaserJet Series II, IBM Proprinter XL24. 2 HP LaserJet compatible font slots, multiple purpose tray. 4,000 prints per month. 35 pounds.



ExpressWriter 311: 24-pin dot matrix, 180 cps draft/60 cps letter quality, 3 resident emulations (Toshiba/Qume, Epson LQ, IBM Proprinter), 16K buffer, 5 resident fonts plus card slots, 11 lbs.

Numeric Keypad: full function, 15 or 17 keys, for many of our portable PCs.



T1200HB: 10.8 lbs, 9.54MHz 80C86, 20MB hard disk, 1MB RAM, includes 384KB LIM-EMS. Removable/rechargeable battery pack.

P321SL/SLC (color): 216/72 cps, 24-pin letter quality, up to 360x360 DPI graphics, Toshiba/Qume and IBM emulations standard, Epson and Diablo emulations optional, 32KB print buffer, front panel controls, advanced paper handling.

People have their own ways of doing things. Some think fast. Some slow. Some work from 9 to 5. Others never stop.

That's precisely why we offer so many different products.

Including the widest range of truly portable PCs anywhere.

And a line of printers that includes everything from a high volume laser to a four-pound, letter-quality, battery-operated portable.

All of which can be easily networked. But all of which are designed to meet the individual needs of our users.

Because, at Toshiba, we have an incredibly diverse and sophisticated customer base.

And from what we can tell, they have only one thing in common.

They're all different.

For more information, just call us at 1-800-457-7777.

In Touch with Tomorrow

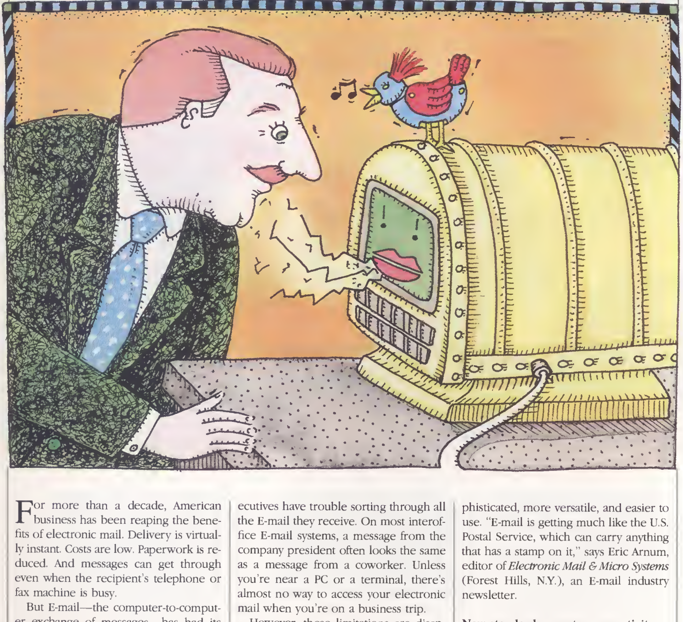
TOSHIBA

Toshiba America Information Systems, Inc., Computer Systems Division

CIRCLE 101 ON READER SERVICE CARD

ELECTRONIC MAIL: READY FOR THE 1990s

E-mail systems get a new look, better connectivity, and voice.



FRANKLIN HAMMOND

For more than a decade, American business has been reaping the benefits of electronic mail. Delivery is virtually instant. Costs are low. Paperwork is reduced. And messages can get through even when the recipient's telephone or fax machine is busy.

But E-mail—the computer-to-computer exchange of messages—has had its limitations. Most electronic-mail systems transmit only text. Many commercial, public E-mail systems are incompatible with one another. Some E-mail subscribers suffer from E-mail overload. And executives have trouble sorting through all the E-mail they receive. On most interoffice E-mail systems, a message from the company president often looks the same as a message from a coworker. Unless you're near a PC or a terminal, there's almost no way to access your electronic mail when you're on a business trip.

However, these limitations are disappearing. Thanks to ongoing advances in communications technology and software development, as well as the adoption of new industry standards, electronic mail is rapidly becoming more sophisticated, more versatile, and easier to use. "E-mail is getting much like the U.S. Postal Service, which can carry anything that has a stamp on it," says Eric Arnum, editor of *Electronic Mail & Micro Systems* (Forest Hills, N.Y.), an E-mail industry newsletter.

New standards, greater connectivity

Industry giants, as well as small, startup companies, have recently announced products designed to enhance electronic-mail systems by incorporating such features as near-photo-quality graphics, voice annotation, and database-sorting techniques. This new push to develop electronic-mail products is due to the surging popularity of E-mail in the business and academic worlds.

"Ninety percent of the people I deal with are on E-mail," says Nicholas Negroponte, director of The Media Laboratory at Massachusetts Institute of Technology. Since he's on the road about four of every five days, Negroponte uses his laptop computer to communicate via E-mail with his Cambridge, Mass., office. "It's my lifeline," he says. "I can hardly imagine living without it."

According to Arnum's newsletter, the number of users with electronic mailboxes on local area networks (LANs), mainframes, and public mail systems in the United States soared from 430,000 in 1980 to an estimated 8.6 million in 1989. And the number of E-mail messages they sent jumped from 95 million in 1980 to 1.57 billion last year. Experts say E-mail will only grow more popular in the 1990s as it becomes simpler and more useful.

The most dramatic development in E-mail lately has been the implementation of X.400, a new communications standard that defines the rules for interconnecting E-mail systems. Although the standard was first endorsed in 1984 by CCITT, an international committee, public E-mail carriers were slow to adopt it for fear they would lose customers to competing services. But pressure from the federal government and the aerospace industry, which require X.400 compatibility in all their E-mail systems, forced the carriers to make their systems open.

As a result, new electronic "gateways" are allowing customers on competing, public E-mail systems to exchange messages without having to subscribe to different services or learn new sets of commands. Last summer, for example, MCI Mail established a connection with SprintMail (formerly Telemail) and announced plans to hook up with other services, including Dialcom. Plans also are underway to create by 1993 a massive electronic directory of all subscribers to commercial E-mail systems—an E-mail white pages, so to speak.

The adoption of the X.400 standard also promises to provide gateways among corporate E-mail systems and between corporate systems and public carriers. That is the equivalent of adding outside lines to a private phone system.

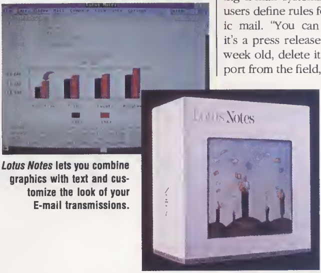
Even E-mail system interfaces—what the user sees and works with on the computer screen—are being updated and improved. Right now E-mail interfaces are pretty lackluster. The average electronic message looks about as exciting as a DOS prompt.

It all looks alike

"One of the problems with E-mail is it's all ASCII text," says Jeffrey Tarter, publisher and editor of *SoftLetter*, a software-industry newsletter. "Imagine if every piece of mail, every publication you got was all one typeface—no logos, no differences in paper stock," he says. "With conventional E-mail, a message from the chairman of the board looks exactly the same as junk mail. That's a problem."

The problem is now being addressed by new graphical operating systems, such as OS/2 Presentation Manager, which are bringing a new look to many software applications, including E-mail.

One program that runs under both OS/2's Presentation Manager and *Microsoft Windows* is Lotus Development Corp.'s recently announced *Lotus Notes*. *Notes* is designed to facilitate communication among work groups on PC LANs or wide area networks. *Notes* can be used for many applications, including sales management, customer service, and project tracking, but an integral feature is a flashy electronic-mail system.



Lotus Notes **lets you combine graphics with text and customize the look of your E-mail transmissions.**

Notes users can exchange complex memos, documents, and reports that resemble the real thing. Backgrounds can be white, just like a piece of paper, or another color. Different fonts and colors can be used for text, headlines, and other elements. And charts, spreadsheets, and graphics can easily be incorporated into a single document.

The advantage of *Notes*' graphical user interface is that "a memo looks like a memo, a letter looks like a letter, and a company report looks like a report," says Tarter. "You have most of the same visual clues that you have going through your paper in-box."

Another problem being addressed by new products is junk or unwanted E-mail. Executives are being flooded with messages, and it's often difficult to identify the important ones.

Weeding out junk mail

Beyond Inc., a Cambridge, Mass., startup company headed by former Lotus executive Chuck Digate, is working on a product code-named Ramus that includes an electronic message-filtering system that can sort and process messages, depending on who sent them. Thus, a message from the boss could be sorted into an "Urgent" folder, mail requiring quick action could be added to a "To Do" folder, while mail sent from addresses on a nuisance list could be trashed.

The product, actually a "front end" application that adds new features to existing E-mail systems based on LANs, lets users define rules for managing electronic mail. "You can set up rules like 'If it's a press release and it's more than a week old, delete it,' and 'If it's a bug report from the field, send back a message-received reply,' " explains product manager Eugene Lee. Ramus is expected to ship sometime this year, he says.

Ramus, *Notes*, and other new products with E-mail features can also filter out news stories from an on-line news service, such as Dow Jones News/Retrieval or Reuters, and move them into your electronic mailbox. For example, an investor could request all stories that deal with takeovers. While several products currently on the market automatically screen news wires, they generally do not interface with E-mail systems. "*Notes* lets subscribers see just the stories they're interested in," says L. Brewster Jackson, senior vice president with Reuters Information Services (N.Y.).

Voice annotation to come

Another new development in E-mail is the integration of voice and text. On the Next Computer System, for example, a message might contain a small icon of a pair of lips. When a recipient moves the cursor over the lips and clicks to activate voice playback, the digitally recorded voice of the sender plays back through a speaker. At the moment, voice annotation is not widely used because voice recordings take up a great deal of hard-disk space. But as disk space gets cheaper and special algorithms for voice compression and decompression become more widely available, voice will play a bigger role on E-mail systems. And with the increasing popularity of telephone voice-mail systems, it seems a logical next step for businesspeople to be able to call in and listen to their E-mail messages, as well as to their voice-mail messages.

"If the '80s has been characterized by a proliferation of these technologies, the beginning of the '90s seems to be characterized by companies trying to tie all the technologies together," says Joseph Fulvio, director of research at Information Publishing Corp., a Houston company that publishes several telecommunications magazines.

Accessing electronic mail over the telephone involves a technology called text-to-speech conversion, in which a synthesized voice reads text out loud. Such technology is already commercially available in special computer systems for the blind and even in hand-held electronic dictionaries. But experts say the voices need to sound a lot more human than they do now.

"Today it definitely sounds robotic and cannot be mistaken for a human being," says Elizabeth Peters, general manager of Berkeley Speech Technologies, a Berkeley, Calif., firm that specializes in text-to-speech conversion. "But it's getting better all the time."

So is electronic mail. *—Steve Stecklow*

80386SX MACHINES MAKE A STRONG COMEBACK

Aggressive pricing and new software drive sales.

Intel Corp.'s 80386SX microprocessor wasn't an instant success when it was introduced last year. In fact, the research firms that keep track of PC sales generally didn't bother to segregate '386SX system purchases from other '386 models until a few months ago. But there seem to be much better times ahead for the '386SX.

Industry leaders like Microsoft Chairman Bill Gates and Intel Senior Vice President David House are now recommending a '386SX-powered PC as the minimal entry-level machine. More than 40 PC-compatible manufacturers have announced a '386SX-based system, and sales are beginning to accelerate. For example, IBM's new SX computer, the PS/2 Model 55SX, accounted for 1% of IBM's unit sales in June 1989, 7% in July, and 13% in August, according to a 1,500-site survey conducted by Computer Intelligence, a La Jolla, Calif., research firm.

A broad choice of software

What's behind this newfound popularity? The main reason is the software you can run on a '386SX that you can't run on a '286. For example, an SX can handle multitasking environments and operating systems, such as *Microsoft Windows/386*, Quarterdeck Office Systems' *Desqview 386*, the '386 version of Unix, and the forthcoming '386 version of OS/2. You can run memory managers like Quarterdeck's *QEMM-386* and Qualitas' *386Max* on an SX. Many applications, such as Borland International's *Paradox 386*, IBM's *Interleaf Publisher*, and Cadkey's *Cadkey 3 Plus* run only on '386-based systems. And more '386-only software is coming.

Functionally, the SX is a slightly detuned but otherwise full-fledged member of the 80386 family. The major difference is that the SX handles input/output chores in 16-bit chunks instead of 32 bits at a time, as the '386 and '486 chips do. In addition, most SX systems are rated at a clock speed of 16 MHz, as opposed to the faster 20-, 25-, and 33-MHz speeds available for '386 systems. However, Intel was scheduled to ship a 20-MHz SX chip at the end of January.

Otherwise, the '386SX processor is identical to its more powerful '386 and '486 siblings. This means the SX can run any '386-only program, as well as any DOS program written for Intel's earlier processors, the 8088, 8086, and 80286. It can also run programs—like *1-2-3* Release 3—that use a DOS extender to access memory beyond DOS's 640K maximum (with some qualifications—see the box on the following page).

Versatile and cost-effective

The SX, like the '386 and '486 chips, features several improvements on earlier processors. The most important is an option known as Virtual 86 mode. In Virtual 86 mode, the processor can establish 1-megabyte memory segments, each of which acts like a separate DOS computer. This provides the SX with the memory protection it needs to allow multitasking environments and operating systems to juggle several DOS applications without crashing.

Simple economics is also driving the conversion to '386 systems. There is still a gap between '286 and '386SX costs, but SX prices are edging closer to '286 prices than they are to '386 prices. The table below shows that the difference in price between a 16-MHz SX system and a 20-MHz '386 system ranges from $900 to nearly $2,000, while the difference between a 12-MHz '286 and the SX averages about $600. This is partly the result of Intel's pricing policies. The chip maker is clearly targeting its '386SX CPU for vol-

LIST PRICES FOR SOME POPULAR SYSTEMS

Vendor	80286 (12 MHz)	80386SX (16 MHz)	80386 (20 MHz)
AST Research	$2,995[1,2]	$3,695	$5,195[1]
Compaq Computer Corp.	$3,599	$4,199	$6,099
Dell Computer Corp.	$2,099[3]	$2,899[3]	$3,799[3]
Everex Systems	$2,938	$3,538	$4,938
IBM	$2,890[2,4]	$3,895[4,5]	$5,495[5,6,7]

[1] with monochrome adapter
[2] 10 MHz
[3] includes monochrome monitor
[4] 30MB hard disk
[5] 2MB RAM
[6] 60MB hard disk
[7] 16 MHz

Unless otherwise noted, prices are for a configuration consisting of 1 megabyte of RAM, 1.2MB 5¼-inch or 1.44MB 3½-inch floppy drive, 40MB hard disk, and VGA adapter. Nonetheless, equipment differences among vendors make it difficult to compare system costs fairly.

ume sales. In the third quarter of 1989, here's what Intel processors cost (each, in quantities of 1,000):

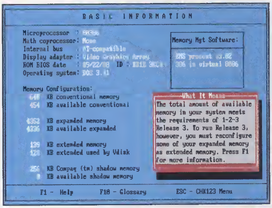
Processor	Speed	Price
80286	12 MHz	$ 30
80386SX	16 MHz	$ 80
80386	16 MHz	$189
	20 MHz	$201
	25 MHz	$249
	33 MHz	$319
i486	25 MHz	$950

But it's not just attractive chip prices that are lowering the cost of SX systems. The chip offers some manufacturing cost advantages, as well. For example, unlike the '386 chip, the SX chip's design and packaging let computer manufacturers use a less expensive robotic surface-mounting technique to install it. And because of the chip's address scheme, a manufacturer can create a zero-wait-state SX system using slower, less expensive DRAM.

Alan Deikman, director of research and development for Mylex Corp. (Fremont, Calif.), a manufacturer of PC motherboards, believes that the price difference between the '286 and the SX will eventually drop to less than $200. In fact, one discount seller, Z-Technology Systems, in South San Francisco, is offering

EXTENDING RELEASE 3: BEWARE OF "SHADOW" RAM

1-2-3 Release 3 offers substantial enhancements to previous versions of *1-2-3*, but in order to run it, you need a '286 or a '386 system with at least 1 megabyte of available memory. To help it use all the memory, Release 3 incorporates a DOS extender—code that allows *1-2-3* to access memory above DOS's 640K limit.



```
                         B A S I C   I N F O R M A T I O N

Microprocessor    : 80386                                Memory Mgt Software:
Math coprocessor: None
Internal bus      : AT-compatible                        EMS present v3.02
Display adapter   : Video Graphics Array                 386 in virtual 8086
ROM BIOS date     : 09/22/88   ID : [illegible]
Operating system: DOS 3.41

Memory Configuration:
  640   KB conventional memory                  ────What It Means────
  454   KB available conventional               The total amount of available
                                                memory in your system meets
 4352   KB expanded memory                      the requirements of 1-2-3
 4336   KB available expanded                   Release 3. To run Release 3,
                                                however, you must reconfigure
  139   KB extended memory                      some of your expanded memory
  128   KB extended used by Vdisk               as extended memory. Press F1
                                                for more information.
  256   KB Compaq (tm) shadow memory
    0   KB available shadow memory

        F1 - Help          F10 - Glossary          ESC - CHK123 Menu
```

Lotus's *CHK1-2-3* utility can tell you a lot about how much and what kinds of memory your system has.

Most '286 and '386 systems come with a megabyte of RAM. However, hardware manufacturers often reserve the 384K memory segment between 640K and 1 megabyte for relocating the system's ROM BIOS. They do this because a system will generally run faster with its BIOS in RAM. The problem is that manufacturers are inconsistent in the way that they reserve this memory, which is known as "shadow RAM." As a result, conflicts can arise with any DOS-extended program that tries to use memory above 640K.

If you're considering a new system, you can prevent potential shadow-RAM conflicts for *1-2-3* Release 3 or any other program by equipping your system with some additional RAM. If you don't want to pay for extra RAM, check with an authorized Lotus dealer for a copy of *Certified Products for Lotus 1-2-3 Release 3, 2.2, 2.01*. This guide identifies all the systems that Lotus has certified will run Release 3 properly.

You may also want to get your hands on a copy of *CHK1-2-3*, a free utility program from Lotus Development Corp. that can help you determine how much and what kind of memory your system has available. For details on the utility, see @Lotus in the November issue, page 22. For a copy, call Lotus Customer Service at 800-345-1043.

If you already own a '286 or '386 system and you suspect a shadow-RAM problem, check with the hardware vendor or with Lotus Product Support. Software and hardware vendors are aware of the problems and may be able to offer some technical assistance. In fact, Rational Systems, the developer of *1-2-3* Release 3's DOS extender, says it is working with chip maker Chips and Technologies to solve the problem, although a solution may be some time away. —*R. D.*

New Version!

"Rescue recovered my Lotus file when nothing else worked..."

Introducing
The new version of Rescue Plus™
-with Auto-Undelete-

The SINGLE solution for 1-2-3 and Symphony file protection and recovery.

Rescue 2.0™ *Ensures you'll never "lose" another spreadsheet.* Automatically recovers unreadable 1-2-3 and Symphony files that won't load.

ResQDisk™ *Guarantees your hard disk data.* The ONLY utility that accurately restores fragmented and hard disk files from: accidental formatting, erasure and FAT damage.

ResQFile™ *Protects your file against disk damage.* Retrieves files from damaged floppy disks that DOS can't read. Recovers files from bad sectors on any disk.

ResQPass™ *Remembers your passwords—when you don't.*

ResQView™ *Makes Lotus data readable.* Decodes disk and file data so that you can identify pieces of your worksheet easily and pinpoint damage.

"I tried the Norton Utilities and just about everything else. Nothing worked until I found Rescue. It recovered my file in minutes."
—Frank Koslowski, S. New England Telephone

Don't wait till disaster strikes!
Order Rescue Plus now.
Send **$119.95** plus $5.00 (S&H) to:
Intex Solutions, Inc.
161 Highland Avenue
Needham, MA 02194
or call (617) 449-6222

MONEYBACK 30 DAY GUARANTEE

INTEX SOLUTIONS, INC.

CIRCLE 102 ON READER SERVICE CARD

a '386SX system, with monochrome adapter, monitor, and 42-megabyte hard disk for $1,395, only $200 more than its comparably equipped 16-MHz '286.

Other companies, including Cumulus Corp. (Cleveland, Ohio), provide '386SX upgrade boards for most AT-style systems for as little as $595. However, those in the know counsel caution when you are buying general-purpose upgrade boards. Before you commit yourself to an upgrade board, make sure it works your '286 system's BIOS (basic input/output system) and other components.

Declining SX prices are also driving down the price of '286-based systems. But Tim Bajarin, executive vice president of Creative Strategies Research International, a research firm in Santa Clara, Calif., expects the mass-market '286 to hold its own as a business machine only for the next couple of years. By 1992, he says, a '386SX system will be the entry-level PC. *—Richard Dalton*

THE GROWING VDT RADIATION DEBATE

New studies try to measure the health risks.

Q: Can radiation from a computer monitor harm you?

A: Nobody knows for sure.

Concerns about radiation from video display terminals have surfaced from

THE MAKING OF 1-2-3/G, LOTUS'S GRAPHICAL SPREADSHEET

Behind the scenes with Marty Fahey, general manager for 1-2-3/G

Lotus Development Corp. will soon release *1-2-3/G*, its graphical spreadsheet for OS/2's Presentation Manager. The program was demonstrated in mid-November at Comdex/Fall '89, at the same time it went into beta testing at numerous corporations. For details on the program's features, see "A First Look at *1-2-3/G*, Lotus's Spreadsheet for OS/2's Presentation Manager" on page 6 of the January issue.

In an interview conducted in early December, *LOTUS* Senior Editor Rich Friedman explored some of the project's background and future directions with Marty Fahey, Lotus's general manager for *1-2-3/G*.

LOTUS: How long has Lotus been working on *1-2-3/G*?

Fahey: Lotus has an advanced development group—a group of people whose job is to try to predict the future. The *1-2-3/G* project started with this group in 1984, just after we released *Symphony*. The first prototypes of *1-2-3/G* were nothing like *1-2-3*. Originally, we started with a blank sheet of paper—we weren't concerned about achieving a high degree of *1-2-3* compatibility. But a year or two later we changed the direction of the project and decided to tie it as closely as we could to *1-2-3*. In 1987 and 1988 we started chasing OS/2's Presentation Manager, but its specification kept changing. It was like trying to build a house on shifting sand. When PM settled down and was finally released in the fall of 1988, our project really started coming together.

LOTUS: Why did Lotus decide to write for OS/2 Presentation Manager instead of first writing for *Microsoft Windows*?

Fahey: We didn't start writing for PM. The goal was always to write a spreadsheet for the next generation of PC operating systems, which back then was called DOS 5 but ended up being OS/2. We knew we'd have a graphical environment, more memory, and multitasking. Along the way, a lot of things happened. We evaluated *Microsoft Windows* and actually prototyped our early product for it. However, we felt that people would want more than 640K of memory and that *Windows* was only a transition to OS/2, which is a much more powerful operating system.

LOTUS: What are the system requirements to run *1-2-3/G*?

Fahey: The typical OS/2 Presentation Manager user will run it on a 4- to 6-megabyte 80286 or 80386 machine.

LOTUS: How easy will it be for an accomplished *1-2-3* user to move to *1-2-3/G*?

Fahey: An accomplished user will feel very comfortable within minutes. We conducted a lot of research to find out what *1-2-3* keystrokes people used and in what combinations. About 85% of usage is confined to 27 keystroke combinations. We retained the integrity of those keyboard sequences, so such *1-2-3* commands as Range, Format, Copy, and Move all work the same in *1-2-3/G*.

LOTUS: Why should a *1-2-3* user move to *1-2-3/G*?

Fahey: Lotus's product strategy is to have versions of *1-2-3* on all major platforms so that users can choose Release 2.2, 3, or G, depending on their current application needs. *1-2-3/G* takes advantage of the increased power of OS/2 and PM—multitasking, expanded memory, and data "hot links" between programs. And with *1-2-3/G*'s Solver technology, for example, we've taken the spreadsheet from a "what-if" to a "how-to" analytical tool.

LOTUS: Are Solver and OS/2's graphical user interface [GUI] features worth upgrading your hardware for?

Fahey: That's a question that only users are able to answer. If people don't see a benefit in moving to *1-2-3/G* and are happy with Release 2.01, fine. I think that there are some tremendous benefits to moving to a GUI environment, such as lower training costs. In a large organization, training is a much more significant expenditure than upgrading hardware.

LOTUS: What is the most important *1-2-3/G* innovation?

Fahey: Most of what you'll read about will be Solver, but I think the best design work in the product went into maintaining *1-2-3* compatibility in a GUI world.

LOTUS: How difficult was it for Lotus to get such a high degree of data and keystroke compatibility between *1-2-3* and *1-2-3/G*?

Fahey: It was very hard. It's a lot easier for engineers to design for the future if they don't have to think about the past. But with *1-2-3/G*, we had to consider what existing *1-2-3* users were accustomed to. For example, you can specify a Copy command in *1-2-3/G* by using either the keyboard or the mouse, but at the end of the operation, a *1-2-3* user time to time over the past decade, but until recently most scientists in and out of the VDT industry dismissed them out of hand. For years experts flatly denied that radiation from a VDT was any more dangerous than sitting next to an electric light bulb.

No wonder. With the office VDT count estimated in the vicinity of 30 million terminals and growing, the implications for worker health and product liability are staggering. A health-hazard time bomb of such magnitude, sitting on virtually every office worker's desk, would dwarf the litigation potential of cigarette smoking and asbestos combined.

The official position of VDT manufacturers, such as IBM, and of various industry trade groups that represent VDT makers and users, remains what it has always been: There is no scientific evidence to suggest that VDT radiation is harmful to humans. Period.

Nonetheless, IBM recently announced a new line of VDTs, called Infowindow, whose radiation levels are lower. IBM, which sells more than two million VDTs a year, says the radiation levels in its new terminals meet the Swedish standard established in 1988, one of the toughest in the world. Paul F. Snayd, manager of IBM's VDT and Ergonomics Project Office, emphasizes that the company's decision to produce low-radiation VDTs was motivated by market considerations rather than by a belief that VDT radiation

---

will want the cursor to end up where it does in *1-2-3*. When you hit End DownArrow in *1-2-3/G*, you want the operation to work the way it does in *1-2-3*.

When designing *1-2-3/G* we always had to ask, How does *1-2-3* do it? That question added a layer of complexity to almost everything we did. We also had to make difficult decisions about when to make things different. We had to ask whether it was worth making a change that breaks compatibility between *1-2-3* and *1-2-3/G*. In some areas, such as printing and graphing, there's a tremendous payback for breaking compatibility.

LOTUS: Why did Lotus offer to share *1-2-3/G* interface code with WordPerfect Corp.?

Fahey: We didn't start out with that thought in mind, but WordPerfect is the major player in word processing, as we are in spreadsheets. So we got together and talked. It turned out that they had many of the same problems we had. They have a keystroke interface that millions of people know; so do we. We both wanted to help our users make the transition to a GUI. It hasn't been one-sided—we've shared some ideas with them, and they've given us some great ideas. As we go forward, it's important that our applications work together. Our respective customers can only benefit from the relationship.

SETH RESNIK

LOTUS: Can *1-2-3/G* be linked to remote databases?

Fahey: Yes, in two ways: We incorporated the same DataLens technology that Release 3 has. For example, the Release 3 drivers that access Borland International's *Paradox* or IBM's OS/2 Extended Edition Database Manager will also work with *1-2-3/G*. In addition, in the future there will not be as much emphasis on stand-alone spreadsheets or stand-alone databases. Lotus's forthcoming database product, Lotus/DBMS, shares code with *1-2-3/G*. For instance, when you use the charting capability in *1-2-3/G,* it will be the same charting capability that's in Lotus/DBMS.

LOTUS: What did you have to leave out of this first version of *1-2-3/G*?

Fahey: There are some things we would have liked to include. But instead of telling you what they are, I'd rather wait and show you in the next release.

LOTUS: What types of add-ins can we expect for *1-2-3/G*?

Fahey: There will be a lot of new add-ins. When *1-2-3* first came out, nobody could predict what add-ins people would want. However, there are clearly a lot of niche areas and vertical-market applications that will be covered by auxiliary software. We are working with some third-party vendors.

LOTUS: Is it easy or difficult for outside developers or corporate users to write custom add-ins for *1-2-3/G*?

Fahey: It will be relatively easy because the product will support LEAF, but probably not in the first release. LEAF is a programming language that exists in Release 3.

LOTUS: Are there plans to port *1-2-3/G* to other hardware platforms, as Lotus is doing with *1-2-3* Release 3?

Fahey: Potentially, but there's no announcement.

LOTUS: How does *1-2-3/G* compare to the forthcoming *Microsoft Excel* for OS/2's Presentation Manager?

Fahey: I think the most important point to remember is that 8 million people know how to use *1-2-3*. Even if the products had equal capabilities—and they don't because of *1-2-3/G*'s advanced new features like 3-D, DataLens, and Solver—the familiarity people have with *1-2-3* is a key issue in evaluating the two spreadsheets. ■

poses a danger to health or safety.

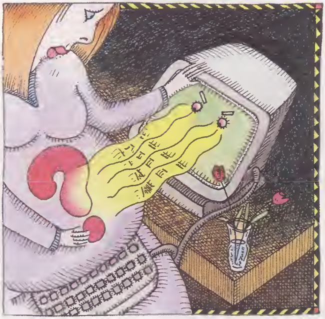
But scattered animal experiments have turned up abnormalities in chick and mouse embryos exposed to VDT-type radiation, and a few population studies have linked miscarriages to VDT use among female office workers.

More questions than answers

In the face of new knowledge about how electromagnetic radiation affects living organisms, scientists and researchers are pushing ahead with laboratory and epidemiological (population study) research that the mainstream scientific community ridiculed as meaningless only a few years ago.

The dimensions of the VDT question changed abruptly in 1988 when a Kaiser Permanente Medical Care Program study of 1,583 pregnant office workers in the San Francisco Bay area found that women in clerical jobs who spent more than 20 hours a week at VDTs during their first trimester of pregnancy suffered 80% more miscarriages than those who didn't work with VDTs. The Kaiser study was a bombshell because it revealed a link, causal or not, between VDTs and health problems. The project leaders didn't quite know what to make of the results and they said so, emphasizing that they had found something that definitely needed further investigation.

Although scientists now know more than they did only a few years ago, it will still be years before they have a definitive answer to whether prolonged exposure to VDT radiation is a serious health threat. And other research is beginning to point to psychological and physical stress as the most serious sources of VDT health problems.



FRANKLIN HAMMOND

'Too little, too late'

Getting definitive answers, or at least a level of data sufficient to act on, is a slow process. Some critics say the federal government has not been enthusiastic in funding such studies. The National Institute for Occupational Safety and Health (NIOSH) will complete a two-year, much-delayed VDT study of 2,500 telephone operators in early 1990. Approval for the study was stalled by the Reagan Administration's Office of Management and Budget, which wanted to delete some of its questions.

Michael J. Smith, professor of industrial engineering at the University of Wisconsin (Madison), dismisses the study as "too little, too late." He adds that NIOSH has not started any new VDT research. "[Government] research has gone down the tubes," he says.

However, after a long delay, the National Institutes of Health recently funded a four-year, $2 million Mt. Sinai School of Medicine study of the effects of VDTs and other office equipment on 8,000 female office workers. In addition, the Kaiser Permanente Medical Care Program is starting a two- to three-year study, in cooperation with the California Department of Health Services, which will, among other things, look at the effects of electromagnetic fields on pregnancy outcomes. Overseas epidemiological studies include a research effort on VDT use in Great Britain. Researchers are studying approximately 8,000 women and are scheduled to complete the study this year.

Media coverage of the possible VDT health hazards is also increasing. In a controversial series of three articles published in *The New Yorker* last June, Paul Brodeur, a journalist who covers public health issues for that magazine, chronicled—and stirred up—the movement to gather more information on possible radiation health hazards.

Unnecessary exposure

Brodeur took no prisoners. The thrust of his encyclopedic coverage was that through a massive cover-up and malfeasance by public and industry officials, scientists, the U.S. military, and even the press, millions of Americans are being unnecessarily exposed to potential health hazards from low-level electromagnetic radiation that has become almost ubiquitous in our society. This radiation comes from the alternating current produced by power-distribution transformers located near homes, from certain types of U.S. Air Force radar installations, from electric blankets, and from the cathode ray tubes (CRTs) in millions of VDTs.

Brodeur concluded that low-frequency magnetic radiation from VDTs might be hazardous to the reproductive process and biologically harmful in the same way that the radiation from electrical power lines might be contributing to higher-than-normal incidences of cancer in children living near them.

The troublesome phrase in all of these cases is "might be." Brodeur called for research to find out for sure. Most of the VDT-oriented research so far has focused on reproductive problems—spontaneous abortions and defective fetuses. This bothers radiation activist Louis Slesin, who thinks the cancer connection in particular has been given short shrift. "Brodeur doesn't say you're going to get cancer," Slesin says, "but he raises questions that need to be answered. Nobody's picking up on that."

Slesin, who figures prominently in Brodeur's writings, publishes a bimonthly newsletter on VDT health and safety called *VDT News* (P.O. Box 1799, Grand Central Station, New York, NY 10163; $87 per year). He is particularly concerned about the lack of basic research. "The real problem at the moment is that there have been no systematic measurements made of VDT radiation," Slesin says. "We're not playing with a full deck when it comes to basic data."

Many kinds of electrical equipment, including home appliances with motors in them, such as hair dryers and electric food mixers, produce radiation. Whether it's dangerous depends on what kind of radiation it is, how strong it is, and how long you are exposed to it. Ionizing waves, such as X-rays, can damage living cells. The cathode ray tube in a VDT produces some X-rays, but experts agree that the glass screen of a properly operating CRT blocks these rays. That means X-rays from the screen won't cause cataracts or other radiation-induced eye damage.

Many forms of radiation

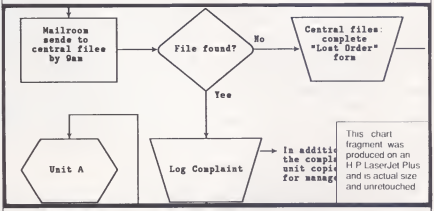
Until recently it was thought that nonionizing radiation, which includes broadcast radio and TV signals, was benign and could bathe us constantly with no ill effects. VDT concern now centers on this nonionizing radiation at very low frequency (VLF) and extremely low frequency (ELF) levels. Monitors emit radiation, mostly from the backs of their cabinets, at both frequencies: VLF from the flyback transformer that moves the electron beam horizontally across the screen at about 15,000 to 30,000 cycles per second (Hz), and ELF from the vertical deflection coils that refresh the screen at a rate of 55 to 75 Hz, or 55 to 75 times per second. This "pulsed" radiation—waves that are emitted in cyclic bursts rather than continuously—is causing the most concern.

As recently as a decade ago, the conventional wisdom in the scientific community was that nonionizing radiation could cause damage only by raising the temperature of biological cells. Examples of this phenomenon are the infrared and ultraviolet rays from a heat lamp that burn your skin if you expose yourself to them too long and a microwave oven that cooks food with high frequency waves. Thus, the "safe" exposure threshold for this kind of radiation was set at power intensities far above the levels produced by a VDT. Then it was learned that weak, low-frequency, pulsed magnetic fields with intensities as low as two or three milligauss (units of magnetic induction) can interfere with cell functions, and the door was opened to a new range of concerns—and research.

In early September the Second International Conference on Work with Display Units, held in Montreal, highlighted the latest scientific findings in the VDT

EasyFlow

An on-screen chart processor that knows about charts and diagrams, not just another "screen-draw" program that makes you do most of the work. **EasyFlow** is a powerful full-screen graphics program dedicated to data-flow diagrams, flow charts and organization charts. With it you can quickly compose diagrams. More important, you can easily modify them so they are always up to date.


Mailroom sends to central files by 9am
File found?
No
Yes
Central files: complete "Lost Order" form
Unit A
Log Complaint
In additi
the compl
unit copi
for manag

This chart fragment was produced on an H P LaserJet Plus and is actual size and unretouched

Automatic. Fully automatic text centering within shapes. Fully automatic line routing & rerouting. Fully automatic placement of text along lines.

Fast. Written in assembly language for speed.

Large. Diagram size limited only by available memory. Supports LIM expanded memory. Diagram too large for your printer? EasyFlow automatically breaks the diagram up & prints it in page size pieces.

Standard. All standard data flow and flowcharting shapes included. Other shape libraries are available.

User friendly. Don't take our word for it. PC Magazine says *"EASYFLOW lives up to its name. It's hard to imagine any easier and more flexible way to produce basic and even complex flowcharts" (March 10, 1987 issue, Page 278).*

Mouse. Optional but fully supported.

It works. Over 60,000 copies sold. Two of the "big five" accounting firms have world wide site licenses for the use of EasyFlow.

It prints. On most popular printers including IBM, Epson, Okidata, Toshiba, HP LaserJets, HP Desk Jet, XEROX 4045, postscript printers and many others.

It plots. On HP7440, 7475, 7550, 7585B Plotters and HI Plotters.

Documented. 190 page manual plus over 250 screens of context sensitive help.

Rush delivery. Order by noon today (eastern time) and you'll have it tomorrow. Rush delivery charge is $10.50 (instead of $2.00) and is available only to continental USA.

EasyFlow works on IBM PC"s, IBM PS/2 and compatibles. Requires 512K memory, hard disk and an IBM CGA/EGA/VGA or Hercules monochrome compatible adapter card.

Order direct for only **$149.95** + $2.00 S&H (USA/Canada), $10.00 (foreign). Payment by M.O., Check, VISA, MasterCard or Company PO.

HavenTree Software Limited
PO Box 1093- E
Thousand Island Park, NY 13692

Order Desk: 1-800-267-0668
Information: (613) 544-6035 ext. 83
Fax(G3): (613) 544-9632

controversy. Good news for VDT users came in the form of preliminary results from a large laboratory study of mice done at the University of Toronto. There was no significant difference in the rate of spontaneous abortions between control mice and those exposed to various intensities of VLF electromagnetic radiation at a frequency of 20 KHz.

Further research required

Seizing on the Toronto study as further proof that VDT radiation isn't harmful, Linden Heck, executive director of the Center for Office Technology (COT), a New York–based VDT trade group, points out that research has yet to turn up any "demonstrable link" between VDTs and radiation hazards. "Of course," she says, "further research ought to be done."

The Toronto mouse study, which was sponsored by IBM and Ontario Hydro, the Canadian hydroelectric utility, was received with more caution by researchers at the session. "The Toronto study looks good," says Dianne Berthelette, general secretary of the conference. "But now I need to study the report. And I'll have to wait for the rest of the report on fetal malformations" [which was published in November 1989]. Berthelette is a professor in the Department of Administrative Sciences at the University of Quebec, in Montreal.

The VDT radiation question is, of course, a very emotional one. And, unfortunately, much of the research has been flawed by biases, either on the part of the researcher or because of certain limitations built into the study.

The 2,500-woman NIOSH epidemiological study now nearing completion is an example of the latter. This study compares telephone operators who work with VDTs with telephone operators who don't use terminals. This study has been criticized because of alleged "meddling" by the Reagan administration, which required NIOSH to drop certain questions about fertility and stress. Louis Slesin of *VDT News* believes the changes are serious flaws in the study. "If it turns up anything positive, it will only point to the need for another study," he says.

Teresa Schnorr, director of the study, disagrees. Unlike the first Kaiser study, which was designed for a different purpose, "our study will actually be able to calculate how many hours a woman sat in front of a VDT in her first trimester of pregnancy," she says. "If there is a relationship, we should be able to see it."

The NIOSH study also samples ionizing radiation, static electricity, electromagnetic fields, and body currents from two different models of VDTs used by the operators. But Schnorr concedes that the questions on fertility she had to omit "will make it easier to criticize the results" and also will make the study less valuable than it might have been.

Unlike the Kaiser and NIOSH studies, which were "retrospective" in that they asked women about previous VDT use and relied on personal recall, the Mt. Sinai study is a "prospective," or forward-looking, investigation that will track the effects of different levels of smoking, alcohol, and VDT use on 8,000 female office workers in their child-bearing years. Although VDT radiation isn't a primary focus, it is a significant aspect of the study. The population will be selected, with the help of various union and employee groups, from among office workers located in Cleveland, Boston, New York, and one yet-to-be-named city in California. It will take four years to complete.

Reducing the risk

Although the rate of research is accelerating, uncovering the facts is still a long-term proposition. In the meantime, what should you do if you work at a VDT? Remember, it is chronic exposure—four hours or more a day—that is of concern, not occasional use.

In a situation where VDTs "may or may not be the problem, we should remove the risk," says Sharon Danaan, research director for the organization 9 to 5, National Association of Working Women. 9 to 5 urges pregnant office workers to try to arrange for half-time work on VDTs. *VDT News* publisher Slesin advises people to turn off their VDTs when they are not actually using them. Because all radiation falls off sharply with distance, Slesin recommends sitting three feet from any monitor, including those of your coworkers.

Why not just shield the radiation? A cottage "shielding" industry has sprung up for just that purpose. Some companies offer screen shields and others offer lead aprons that are supposed to protect users from radiation. Unfortunately, neither is effective, and the weight of the aprons may be harmful to a pregnancy.

Electrical fields can be shielded by grounded screen shields, and weak X-rays can be stopped by lead aprons. But unlike X-rays, which travel in a straight line, low-frequency magnetic waves pass through and around most metals, including lead. Even the "shielded" monitors that IBM and other VDT producers make primarily for the Swedish market do only part of the job; for the most part, they shield VLF but not ELF radiation. No one makes an ELF shield.

Alternatives in shielding

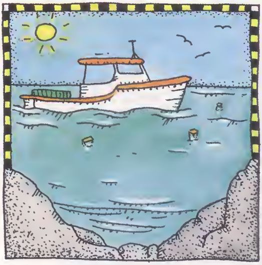
That's why an enterprising Massachusetts firm has produced a replacement monitor that emits no radiation at all. George Lechter, president of Safe Computing (Needham, Mass.; 800-222-3003), argues that three feet is still too close to be totally safe. His solution is a completely shielded liquid-crystal screen that emits zero radiation. Unmodified LCD screens, such as those found on portable computers, emit some electric and magnetic radiation, but not as much as a CRT. The $695 black-and-white screen isn't quite as sharp as a CRT, but Lechter says he's sold more than 3,500 of them since they came on the market last spring. Customers include state and federal government agencies.

Another alternative is the black-and-white Macintosh. Lechter says the Mac emits one third the radiation of regular monitors, probably because of its smaller size.

If you want to measure just your VDT or power-line radiation levels, Lechter will sell you the Safe Meter for $145 (or rent it to you for $39.95 a week). What you do after you get those readings is up to you.

If you believe IBM and the Center for Office Technology, you'll do nothing. Both of these organizations declare unequivocally that scientific research does not and has never shown there to be any danger from VDT radiation.

Professor Smith of the University of Wisconsin isn't that convinced, but he feels more strongly now than he did a year ago that the problems that exist are more likely due to workplace stress factors than to radiation. In any case, for those who remain concerned, he has calculated an interesting pair of risk factors in terms of the likelihood of a bad reproductive outcome for a woman: For a woman using a VDT, the risk ratio is 1.5 to 1. For a woman who smokes, the risk ratio is 8 to 1. *—A. Richard Immel*



NEW ENGLAND NUMBERS

Now your computer can check up on New England business and economic statistics with just a phone call. The New England Electronic Economic Data Center, a joint effort of the Federal Reserve Bank of Boston and the University of Maine, gives you 24-hour-a-day electronic access to New England economic data. You can get all the news that's fit to publish on employment figures, consumer and financial information, housing, construction, and energy data, federal procurement activity, and state taxes.

The Data Center team prepares the data in part in *1-2-3* and sends it out in PRN format. With a PC, a modem, and any communications software, you can access the system from anywhere in the world. Just set your modem to full duplex, 8 data bits, no parity, and 1 stop bit, and call 207-581-1867. There's no charge, except for the phone call.

—Jennifer Smith

THE LIVES OF A BATTERY

After the initial media hype over notebook and other subcompact computers, users and analysts began to focus on their key deficiency: poor battery life. NEC Home Electronics' popular UltraLite portable, for example, runs for only about an hour and a half on a battery charge; laptops from Zenith Data Systems and Compaq Computer Corp. can't do much better than three hours.

Now laptop makers are turning their attention to increasing battery life. Since most experts believe that batteries have nearly reached the limits of their capacity, laptop makers are concentrating on finding ways to make their machines more power-efficient.

The first portable to smash the battery-life barrier was the $1,995 Poqet PC, which Poqet Computer Corp. (Sunnyvale, Calif.) released last October. The one-pound hand-held unit can run as long as 100 hours on just two conventional AA batteries instead of the usual heavier and more costly nickel-cadmium batteries. More recently, Psion Inc., of Watertown, Conn., the United States subsidiary of the English firm, announced three 4.5-pound laptops that it claims will run 30 to 75 hours on eight AA batteries.

These portables achieve their exceptional battery endurance through low-power display techniques and the use of more expensive but more efficient CMOS microprocessors. They also use static RAM and solid-state memory cards instead of power-hungry dynamic RAM and magnetic disk drives. And to conserve even more power, the CPU in these machines shuts itself down between keystrokes.

As a result, the Poqet and Psion machines use an average of 0.05 and 0.5 watts of power, respectively—a fraction of the typical 3 to 8 watts of power used by most laptops. And when their standard AA batteries finally wear out, you can buy replacement batteries almost anywhere.

—J. S.

COMPUTER CUISINART

One of the more interesting products to surface recently is the Navigator, from Canon U.S.A. (Lake Success, N.Y.). It is essentially the PC equivalent of a Cuisinart: Think of a piece of office equipment and it's probably in the Navigator.

Integrated into the sleek black unit is a telephone, an answering machine, a fax machine that doubles as a printer and a copier, a PC XT–compatible computer, and a scanner. In addition to its 8086 CPU, the PC has a separate I/O processor to ensure that all the equipment can operate at once. It also offers two ports and two expansion slots, in case you want to attach a printer or install a hard-disk card. A software utility provides phonebook, mailing-list, and other desktop functions.

Tying everything together is a touchpad display that can be used in lieu of the keyboard to recall and dial phone numbers stored in the electronic phone book, program the fax and answering machines, and otherwise control this all-in-one electronic marvel.

This machine is not just for gadget freaks—at $2,995, the Navigator is less expensive than buying comparable individual components, and it takes up less desk space than the average laser printer. Ultimately, says Ken Reifer, national sales manager for the Navigator, Canon plans to provide network drivers for Novell and other local area networks.

—Jon Pepper

FRANKLIN HAMMOND

LOTUS TO SHIP SYMPHONY UPGRADE

By the end of this quarter, Lotus Development Corp. expects to ship *Symphony* Release 2.2. The *Symphony* upgrade includes such enhancements as file linking, more extensive database capabilities, and more options for presentation-quality output.

Similar to the file-linking feature in *1-2-3* Release 2.2, *Symphony* Release 2.2's file-linking feature lets you link individual cells in one worksheet to individual cells in other worksheets. In this way you can bring data from worksheet files on disk into your current file for use in calculations. *Symphony* automatically updates the linking formulas whenever you retrieve the file, or you can update them manually.

To help you use the file-linking feature, *Symphony* borrows "viewer" technology from *Lotus Magellan* so that you can browse the files on your hard disk from within *Symphony*.

To extend *Symphony*'s database functions, Release 2.2 will incorporate Personics Corp.'s *@Base* add-in, which lets you build and use a relational disk-based database of up to 32 megabytes. Because the add-in stores files in *dBase*'s DBF format, you can also create, edit, and use *dBase* files from within *Symphony* Release 2.2. *@Base* lets you develop database queries, sort databases on any number of fields, produce cross-tabulated reports, and easily transfer data between *@Base* and *Symphony* for analysis.

Symphony Release 2.2 will also incorporate the *Allways* spreadsheet-publishing add-in, previously available as a separate program. Tighter integration means that you can, for example, edit cells directly from within *Symphony* Release 2.2. *Allways* can help you prepare professional-looking spreadsheets, reports, forms, and compound documents containing numeric data, graphs, and text.

Release 2.2 also offers enhanced expanded-memory support. This enhancement allows *Symphony* to make better use of any expanded memory you have available, up to 4 megabytes. If you have expanded memory, you'll be able to build larger *Symphony* spreadsheets and applications than you now can. In this case, expanded memory is memory above 640K that meets version 3.2 of the Lotus/Intel/Microsoft Expanded Memory Specification. Don't confuse it with extended memory.

Finally, *Symphony* Release 2.2's macro capabilities include an enhanced step mode for easier macro debugging. Release 2.2 will continue to carry a suggested retail price of $695. At press time, Lotus had not set an upgrade price.

WINDOWS/386–RELEASE 3 CONFLICT EXPLAINED

With all the recent confusion over the direction of personal-computer operating systems, many people are unclear about which operating systems *1-2-3* Release 3 supports. Here's some information that may help.

Under OS/2, Release 3 takes advantage of OS/2's ability to use the protected mode of both the 80286 and the 80386 processor to allow an application to address up to 16 megabytes of extended memory. Under DOS, Release 3 accomplishes this support for larger memory by using its built-in DOS-extender technology to run in protected mode.

Also under DOS, *1-2-3* Release 3 will run under *Microsoft Windows 286*—the most widely used version of *Windows* today—because *Microsoft Windows 286* does not use extended memory or the protected mode of the microprocessor. However, Release 3 does not run under *Microsoft Windows/386*. This incompatibility exists because *Windows/386* uses hardware features unique to the Intel 80386 processor chip that prevent applications from running in protected mode and using extended memory. An industry-standard protocol called Virtual Control Program Interface (VCPI) has been adopted to circumvent this restriction. But because *Windows/386* does not support VCPI, it cannot execute applications that depend on this technology.

Many software developers, including Ashton-Tate Corp., Autodesk, DataEase International, and Informix Software have adopted the VCPI protocol. In the meantime, *1-2-3* Release 3 will run under other popular DOS control programs that provide VCPI support, including Quarterdeck Office Systems' *Desqview 2.2* and *Desqview 386*.

Lotus Development Corp., Microsoft Corp., and other software vendors are currently working to resolve issues of compatibility that users face when they work with multiple programs that use DOS extenders and protected mode. The goal is to ensure that users will be able to take full advantage of the extended memory on their 80286 and 80386 PCs.

LOTUS ANNOUNCES 1-2-3 FOR SUN

In January Lotus Development Corp. and Sun Microsystems announced *1-2-3* for Sun, the offspring of last summer's joint development and marketing agreement. *1-2-3* for Sun is a version of *1-2-3* Release 3 ported to and optimized for each of Sun's three Unix-based computing platforms: its RISC (reduced instruction set computing)-based SPARC workstations, its Motorola M68000-based Sun-3 line, and its 80386-based Sun386i. All three machines use the SunOS operating system.

Because Sun's SPARC systems are compatible with SPARC systems from other vendors, *1-2-3* for Sun is expected to have an even broader hardware base. "SPARC makes it possible for a range of systems, from laptops to supercomputers, to run identical applications software," says Scott McNealy, Sun's president and CEO.

Initially, *1-2-3* for Sun will run under the SunView user interface, but Lotus intends to support the Sun Open Look graphical user interface as well.

1-2-3 for Sun will be optimized to take advantage of Unix's strengths, such as multitasking and unattended operation—the ability to execute operations and process information automatically at predefined times or intervals. The program will fea-

SAVE 33%
VHEN YOU
UBSCRIBE
TO *LOTUS.*

Take advantage
f this special offer by
ompleting one of the
ubscription cards at
ight. You'll receive a
ne-year subscription
or just $24—that's 33%
ff the annual newsstand
rice.

SUBSCRIBE & SAVE!

YES, please send me 12 monthly issues of ***LOTUS*** for just $24—a 33% savings off the annual newsstand rate of $36.00.

☐ Bill me later ☐ Payment enclosed

Name______________________________

Company______________________________

Address______________________________

City/State/Zip______________________________

Please allow 4–6 weeks for delivery of your first issue. Send foreign orders prepaid in U.S. funds: $28 Canada, $100 (airmail) all others.

42XA3

SUBSCRIBE & SAVE!

YES, please send me 12 monthly issues of ***LOTUS*** for just $24—a 33% savings off the annual newsstand rate of $36.00.

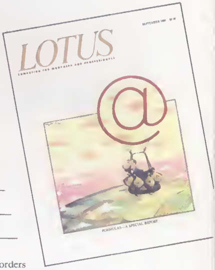
☐ Bill me later ☐ Payment enclosed

Name______________________________

Company______________________________

Address______________________________

City/State/Zip______________________________



Please allow 4–6 weeks for delivery of your first issue. Send foreign orders prepaid in U.S. funds: $28 Canada, $100 (airmail) all others.

42XA3

SUBSCRIBE & SAVE!

YES, please send me 12 monthly issues of ***LOTUS*** for just $24—a 33% savings off the annual newsstand rate of $36.00.

☐ Bill me later ☐ Payment enclosed

Name______________________________

Company______________________________

Address______________________________

City/State/Zip______________________________

Please allow 4–6 weeks for delivery of your first issue. Send foreign orders prepaid in U.S. funds: $28 Canada, $100 (airmail) all others.

42XA3

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 1264 BOULDER, CO

POSTAGE WILL BE PAID BY ADDRESSEE

LOTUS
Subscription Department
P.O. Box 52350
Boulder, CO 80321-2350

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 1264 BOULDER, CO

POSTAGE WILL BE PAID BY ADDRESSEE

LOTUS
Subscription Department
P.O. Box 52350
Boulder, CO 80321-2350

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 1264 BOULDER, CO

POSTAGE WILL BE PAID BY ADDRESSEE

LOTUS
Subscription Department
P.O. Box 52350
Boulder, CO 80321-2350

LOTUS BACK ISSUES

Request Your FREE INDEX!

LOTUS back issu are the best investment you can make in your reference library! Issues are $5 each, and quantities are limited. For more information on how to order, and to receiv your FREE index of *LOTUS* articles, please write:

LOTUS
Single Copy Sales
P.O. Box 9123
Cambridge, MA 02139-995

Order soon—
quantities are limited!

Foreign orders: $7/copy Canada,
$10/copy (airmail) all others.

ture full keystroke and file compatibility with other PC versions of *1-2-3* and will support Sun's NFS networking software.

"*1-2-3* for Sun reinforces Lotus and Sun's commitment to provide applications solutions and a true migration path for business users in the emerging desktop-Unix marketplace," says Frank Moss, vice president of Lotus's Networked Applications and Systems Division.

The program is scheduled for release in the first quarter of this year and will be sold exclusively through selected Lotus-authorized resellers. At press time prices had not been set for the Server and Node Editions of *1-2-3* for Sun, but a single-user license will cost $695. For more information, call 800-343-5414. Lotus says it is investigating the possibilities of porting *1-2-3* to other Unix platforms.

NOTES SHIPS

In December Lotus Development Corp. shipped *Lotus Notes*, a group communications program that lets people create and share information over personal-computer networks.

Sales of the program got off to a rousing start: Price Waterhouse purchased 10,000 copies for use on its worldwide network. Manufacturers Hanover Trust Co. has also begun pilot *Notes* installations, and Reuters Information Services is developing *Notes* applications for its real-time news services.

Notes is based on the client/server computing model, which connects PCs via networks to shared database servers. The *Notes* "client" features a graphical user interface that runs under OS/2 Presentation Manager and also under DOS with *Microsoft Windows*. The *Notes* "server" runs under OS/2 with Novell, 3Com, or IBM network operating systems. For more on the product's features, see December 1989's @Lotus column, page 20.

Lotus plans to provide "gateways," or communications links, so that *Notes* users can exchange electronic-mail messages with users on IBM Profs, VAXMail, and MHS mail systems. Also in the works is a C-language programming interface, with which customers can develop their own specialized gateways.

To run *Notes* on a workstation, you need an IBM PC AT, PS/2, Compaq, or compatible computer with an 80286 or 80386 processor, a hard disk, and at least 4 megabytes of RAM under OS/2 or 640K under DOS. The *Notes* server must be an IBM PC AT, PS/2, Compaq Systempro, or compatible computer with an 80286, 80386, or i486 CPU, OS/2 Standard Edition or Extended Edition 1.1 or higher, and 5 megabytes of RAM.

At present *Notes* is sold only through a dedicated Lotus sales force. The initial purchase agreement, priced at $62,500, includes 10 sets of documentation and a license to install the program on 200 machines, on-site installation, training, application-design assistance, hotline telephone support, and six months of maintenance. Companies may license additional machines for $295 each (quantity discounts available). For information, contact a Lotus sales office or call Lotus at 617-577-8500, ext. 6603.

TOP HONORS FOR LOTUS PROGRAMS

Last year, *Lotus Magellan, Lotus Freelance Plus, 1-2-3* Release 3, and *1-2-3* Release 2.2 received awards from major personal-computing magazines. A *PC Magazine* Technical Excellence award in the Utilities category went to *Magellan*, a DOS-based utility program that lets users find, view, and use information stored on their hard disks. According to *PC Magazine*, "*Magellan* can do magical things, such as making the guts of your files as accessible as their names."

Magellan also earned recent top ratings from *InfoWorld* and was one of *Home Office Computing*'s "Editor's Picks" for 1989. In addition, the program received a "Most Valuable Product" award from *PC/Computing*.

Lotus Freelance Plus 3.01 received *PC World*'s Best Buy award in the business-graphics software category. According to the editors of *PC World*, "An incredible breadth of features makes *Freelance Plus* 3.01 the best package in the roundup."

The program also received a number-one rating in recent competitive reviews of business-graphics software that were conducted by *InfoWorld* and *PC Week*, as well as the top spot in *Software Digest Ratings Report*.

Software Digest Ratings Report also gave its highest rating to *1-2-3* Release 3—the only spreadsheet in a field of eight to earn four stars. According to the report, "No other program offers [Release 3's] balance of usability, extensive features, and fast performance."

PC Magazine, in recognizing Release 2.2 as a finalist for its Technical Excellence award in Applications, noted that "Release 2.2 has more of what Lotus began in 1983 than ever: tight code that works impeccably. . . . It's what most people need in a spreadsheet."

FNN BUYS LOTUS'S LINC

Lotus Information Network Corp. (LINC), a San Mateo, Calif., subsidiary of Lotus Development Corp., has been acquired by Financial News Network (FNN), a cable television network.

LINC delivers real-time market data on more than 40,000 stocks, options, and commodities to a personal computer or to LINC's QuoTrek hand-held monitor. LINC will be combined with FNN's Data Broadcasting Corp., which delivers market quotes and financial news to PC systems via its FNN:MarketWatch product.

A MAGELLAN NAVY

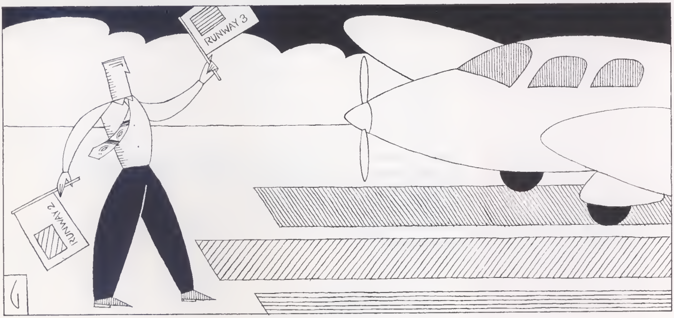
Lotus Development Corp. has begun shipping *Magellan Fleet*, a special package containing 25 copies of *Magellan*, Lotus's DOS-based utility that lets users find, view, and use information stored on their hard disks. *Magellan Fleet* also contains 25 Quick Launch installation and user guides and 4 sets of documentation. It is available through Lotus-authorized resellers at a suggested retail price of $3,375, about a 30% savings over the $195 single-copy price. ■

START HERE

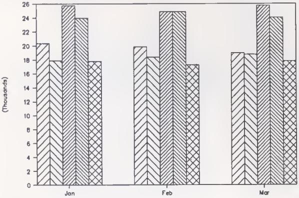
ENHANCED GRAPHS

Titles and legends clarify your graph's message.

BY DANIEL GASTEIGER



A good graph enables you immediately to interpret the data it represents. Take a quick look at the bar graph discussed in last month's column, and you'll agree it violates this basic principle.



On its own, the graph fails to convey any useful information. You can tell it represents something that either took place or will take place in January, February, and March. You can also see the relative sizes of the graph's data elements. But what units make up the elements? Are they dollars, degrees, or miles per hour?

Fortunately, *1-2-3*'s variety of graph-menu commands enable you to create titles and legends that clarify a graph's message and let the data stand on its own. In this article you'll learn to enhance the bar graph shown to the left.

BRING BACK THE GRAPH

If you followed the directions in last month's column and built and saved the worksheet shown at the top of the next page, retrieve it. Then skip ahead to the Graph Titles section. If you don't have the worksheet on disk, you can quickly create it.

In a blank worksheet, enter the labels shown in rows 1 and 7 and in column A. To center the labels in row 1,

---

Daniel Gasteiger is a 1-2-3 *and* Symphony *consultant and a contributing editor to* LOTUS.

JOSEPH GAST

"Now that you're in the executive suite, Dodds, you'll have a company car, an unlimited expense account and Sony diskettes."

When you think about it, it's only fitting that leaders of industry insist on the leader in magnetic media: Sony.

Ever since the introduction of the first tape recorder in Japan, Sony has been perfecting high-density magnetic media.

That's why today Sony is a world leader in audio, video and computer magnetic storage media.

We even invented the format for the 3.5″ disk drive and floppy that are rapidly becoming the world standard.

So, naturally, we had quite a head start when the others finally decided on playing follow the leader.

And the same engineering and technology we applied to create the finest magnetic media for our 3.5″ floppies was applied to all of our magnetic computer media. So our 5.25″ floppies are remarkably reliable, too.

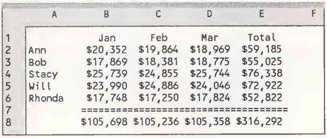
That's why people who absolutely can't afford to lose their data insist on Sony.

But for those at the top, insisting on Sony disks isn't just a sign of high standards, it's also a sign that you've arrived.

SONY®

© 1989 Sony Corporation of America

CIRCLE 104 ON READER SERVICE CARD



```
     A         B        C        D        E       F
1              Jan      Feb      Mar      Total
2  Ann       $20,352  $19,864  $18,969  $59,185
3  Bob       $17,869  $18,381  $18,775  $55,025
4  Stacy     $25,739  $24,855  $25,744  $76,338
5  Will      $23,990  $24,886  $24,046  $72,922
6  Rhonda    $17,748  $17,250  $17,824  $52,822
7          ====================================
8          $105,698 $105,236 $105,358 $316,292
```

precede each with a caret (^). To create the double-dashed line in row 7, enter a backslash followed by an equal sign (\=) in cell B7. Then to copy cell B7 across the row, select /Copy, specify cell B7 as the cell to copy from, and specify range C7..E7 as the range to copy to.

Enter the values in range B2..D6, but omit the dollar signs and commas. They will appear when you format the range. Enter the formula @SUM(B2..D2) in cell E2 and copy that cell to range E3..E6. Enter the formula @SUM(B2..B6) in cell B8 and copy that cell to range C8..E8.

Finally, assign a currency format to all the numbers. Select /Range Format Currency and enter 0. Then specify range B2..E8 and press Return. Your worksheet should match the figure.

To create the graph we finished with last month, select /Graph Type Bar. Select X and specify range B1..D1 as the X data range. Select A and specify range B2..D2, select B and specify range B3..D3, select C and specify B4..D4, select D and specify B5..D5, and select E and specify range B6..D6. Graph ranges A through E each represent a particular salesperson's monthly sales revenue.

To confirm that you've correctly built the spreadsheet, select View from the Graph menu. A bar graph similar to the one shown on page 18 appears.

If no graph appears, review last month's Start Here column. Its brief discussion about computer graphics displays describes the steps to take if you're having trouble with yours.

Depending on which release of *1-2-3* you use, your graph may not exactly match ours. What's important is that the bars in each cluster represent the corresponding values in each worksheet column. When you're satisfied that this is the case, press any key to clear the graphics display. Select Quit to return to Ready mode. Then select /File Save and enter a file name.

If any of these procedures are new to you, you may want to take a look at earlier installments of this column before you continue with the discussion on graphing.

GRAPH TITLES

Titles help you clarify your graph's message. To create a title, press the slash key and select Graph. Since you're about to change a graph option, select Options. Then select Titles.

The menu presents you with four choices. The First and Second choices enable you to enter two titles that appear along the top of the graph. Select First, and *1-2-3* prompts you to enter the first title, which always appears centered above the graph. Enter *NORTHEAST REGION*. Notice that *1-2-3* returns to the Graph Options menu rather than to the Titles menu. Since you need to create some more titles, select Titles from this menu once again.

A graph's second title appears centered directly under its first title. Select Second from the Titles menu and enter *Monthly Sales for NE Sales Force*.

To see the results of your work so far, select Quit from the Options menu. Then select View. The added titles help you understand the graph to some extent. However, unless you examine the underlying worksheet, you still can't determine what data the X and Y axes represent. Titles along those axes will help.

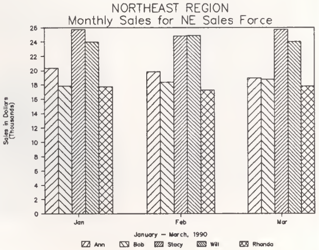
Press a key to clear the graph. Select Options Titles X-Axis and enter *January–March, 1990*. Then select Titles Y-Axis and enter *Sales in Dollars*. Select Quit View to see the results. You can now clearly see that the graph shows dollar amounts. Also, the X-axis title places the sales figures within a specific time frame.

A GRAPH LEGEND

The titles help convey the graph's message, but you still don't know what each bar in a cluster represents. As shown in the graph below, a legend beneath the X-axis title fixes that. The legend pairs the shading pattern of each bar with a description of the data it represents. In this case the description is the salesperson's name.

To add a legend, press a key to clear the graph and then select Options Legend. Select A from the menu to assign a legend for the graph's A range. At this point, you could enter a descriptive label as you did when you assigned graph titles. You can, however, use a shortcut to assign legends and titles. If the worksheet contains the labels you need as legends or titles, just enter a backslash followed by the address of the cell containing the label.

So rather than enter *Ann* as the A data-range legend, enter *\a2*. The backslash tells *1-2-3* to find the graph legend in the cell whose address follows (cell A2).



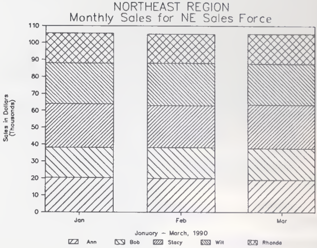
To assign another legend, select Legend from the Options menu. Select B and enter *\a3*. Select Legend C and enter *\a4*. Follow these steps to assign \a5 as the D data-range legend and \a6 as the E data-range legend. Note that these cell references do not automatically adjust when you insert or delete a column or row or when you move a cell. Finally, select Quit from the Options menu and select View. Your graph should resemble the one on the previous page.

With titles and legends, your graph is easy to understand. You can see that except for February, Stacy's sales were higher than those of the other salespeople.

ANOTHER GRAPH TYPE

Now that you have enhanced this simple bar graph, let's look at a different presentation of the data. Press any key to clear the display. Select Type Stacked-Bar. Rather than present a cluster of bars for each month, the stacked-bar graph presents one fat bar split into vertical segments that represent each piece of data for that month. Select View. Your graph should look like the one to the right.

This graph makes it instantly obvious that total sales stay relatively constant from month to month. In fact, unless you place a ruler across the display, you may be unable to detect the small changes in any one salesperson's monthly revenues. When fluctuations in your data are small, you may switch between a bar graph and a stacked-bar graph to compare individual performance within a group to the group's overall performance.



As you've seen, titles and legends help you further clarify your graphs. Other graph-menu choices let you label points in a graph, control a graph's scaling, add grid lines, and so on.

Save the practice worksheet you created so that you can use it as you experiment with your own titles. And read the upcoming installments of Start Here, which will explore other features of *1-2-3*'s graphing facility. ■

Talk to Us on CompuServe

By now you probably know that you can download our 1988 and 1989 models from CompuServe. For details, see the January issue, page 80.

But there's more. Besides downloading template files, you can also leave messages for us—or for anyone else—about the templates or about any other topic having to do with the magazine. Send us an electronic "letter to the editor" if you wish. We'll try to respond promptly to queries and to acknowledge suggestions. Please do not ask us questions that would be more properly addressed to the product support people at Lotus Development Corp.

To leave a message, enter *2* for MESSAGES at the main menu for the Lotus Spreadsheet Products Forum. A Messages menu will appear. Enter *4* for COMPOSE. Then type your message and end it as instructed by CompuServe. At the *To* prompt, enter *LOTUS magazine*. That's the search string we'll use to find your messages. You'll then be asked for the subject. Enter an appropriate phrase. If you're referring to a previous message about the magazine, use the same subject. That's the search string we (and others) use to follow the discussion.

FRAN O'NEILL

To read messages concerning *LOTUS* magazine, go to the Messages menu and choose either 1 for SELECT or 2 for READ.

If you choose SELECT, you will be asked to specify a section. Enter *10*. You then get the first page of a list of message topics having to do with the magazine. If you see one of interest, enter its number at the prompt. You will see the first message on that topic and can see the rest if you wish. When you hit Return after the last message, you return to the list of message topics and can choose another one.

If you choose READ, you will again be asked to specify a section. Enter *10*. You will then be asked to specify a subject. You can enter a key word, or key words, to restrict the topics you see—just as you do in browsing through a library of files. Or you can enter *all*. If you wish to capture messages, set your communications program accordingly.

If you have decided to visit *us* on CompuServe, you will surely want to visit other sections of the Lotus Spreadsheet Products Forum, where you can find many other helpful files and exchange messages with experienced spreadsheet users. Just choose the appropriate section from that forum's main menu. If you use nonspreadsheet products from Lotus, you will want to visit the Lotus Stand-Alone Products Forum as well. Enter *go lotusb* at the main CompuServe prompt or at any other CompuServe prompt that ends with an exclamation point. ○

Plus®

START with the new Hardcard II™ and you can conveniently install

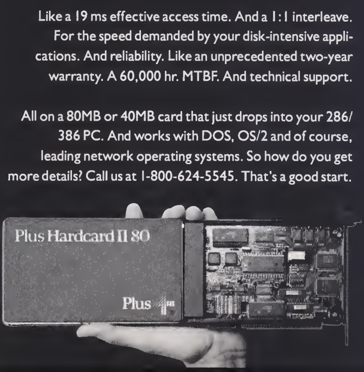
©1990 Plus Development Corp. Hardcard and the Plus logo are registered trademarks and Hardcard II is a trademark of Plus Development Corp.

0 Mb into your 286/386 PC in about 30 minutes start to FINISH

It's from Plus. The same company who brought you the original Hardcard®. Which means you can expect its performance to be as remarkable as its ease of installation.

Like a 19 ms effective access time. And a 1:1 interleave. For the speed demanded by your disk-intensive applications. And reliability. Like an unprecedented two-year warranty. A 60,000 hr. MTBF. And technical support.

All on a 80MB or 40MB card that just drops into your 286/386 PC. And works with DOS, OS/2 and of course, leading network operating systems. So how do you get more details? Call us at 1-800-624-5545. That's a good start.



1-2-3 MACROS

ALPHABETICAL DISORDER

Databases can produce anomalies when sorting names, but our macro will handle the likes of Van Gogh, McEnroe, and even O'Connor.

BY WILLY VANHAELEN

When *1-2-3* sorts names in a database, you're likely to find that the O'Connors, Le-Roys and Le Maitres fall in odd places. This is because *1-2-3* treats apostrophes, hyphens, and spaces as characters.

One solution to the problem is to create an alternative sort key that forces *1-2-3* to follow a more conventional method of sorting. What follows is a description of how to do that.

Suppose you have a database of names. First you would extend that database by one column. Then you'd copy all the last names into the new column. Next you'd remove apostrophes, spaces, and hyphens from those names. For any names that start with Mc, you could begin them with Mac instead. Finally, you would assign the new column as the Data Sort key. Only then would *1-2-3* sort the database conventionally.

In a small database you could do this by hand. But in larger databases it's more practical to let a macro do the job. First you have to decide how you can alter any particular name. For example, how do you change McPherson to MacPherson? An @REPLACE function can do that. @REPLACE has the syntax @REPLACE(*original_string, start_number,length_number,replacement_string*). For names that begin with Mc, for example, you can use the formula as follows:

@IF(@LEFT(*name*,2)="Mc",@REPLACE(*name*,1,0,"a"),*name*)

When you set the length-number argument (length of the original string) to zero, the @REPLACE function inserts the replacement string at the start number in the original string. So if the name begins with Mc, the above formula inserts a lowercase A after M. If the name doesn't begin with Mc, the formula returns the name unchanged.

Deleting an apostrophe, hyphen, or space, which can fall in different positions within a name, is more difficult. You can use the function @FIND(*search_string,string, start_number*) to find the correct position of a particular character. So you could combine @REPLACE with @FIND to delete the hyphen from a name as the following formula does:

@REPLACE(*name*,@FIND("–",*name*,0),1,"")

1-2-3 Data Sorting	Conventional Sorting
De Gerlache	Dean
De la Croix	De Gerlache
De Prado	Delacre
Dean	Dela Croix
Del Rio	Delacroix
Dela Croix	De la Croix
Delacre	Delgado
Delacroix	Del Rio
Delgado	De Prado
Le Maitre	Lee
Lee	Le Maitre
Leman	Le-Maitre
Le-Maitre	Leman
Mackay	Mckay
Malone	Mackay
Mckay	Malone
Odell	O'Connor
Odgers	Odell
O'Connor	O'dell
O'dell	Odgers

FIGURE 1

Here, the @REPLACE length-number argument is 1 (the length of a hyphen). The replacement-string argument is an empty string, which is indicated by two double quotation marks. The formula @FIND("–",*name*,0) yields a number that corresponds to the position of the first hyphen—exactly what we need for the start-number argument. There is one small problem, though. If the formula doesn't find the search string, the @FIND function returns ERR and causes the entire formula to do the same. We therefore have to adapt the formula as follows:

@IF(@ISERR(@FIND("–",*name*,0)),*name*,
@REPLACE(*name*,@FIND("–",*name*,0),1,""))

If there is no hyphen, the first @FIND function returns ERR. Thus the @ISERR function returns a 1, and the whole formula returns the unchanged name. If there is a hyphen, the @ISERR function returns 0 and the formula returns the name without the hyphen.

Willy Vanhaelen is a reader who contributes regularly to the Good Ideas column in the British edition of LOTUS.

CREATE THE MACRO

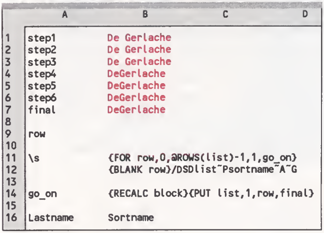
Now that we know how to create formulas to change a name, we're ready to construct a model. First, enter all labels as shown in figure 2. Omit for now the portions of text printed in red. Those are the results of formulas that we'll enter in a moment.

Use the Range Name Labels Right command to assign the labels in range A1..A14 as range names for the adjacent cells in column B. Use the Range Name Labels Down command to assign the labels in range A16..B16 as range names for the adjacent cells in row 17. Then enter the names from the first column of figure 1 in range A17..A36. Use the Range Name Create command to assign the name *list* to range A17..B36.

Now enter the following formulas using the shortcuts detailed in the paragraph that follows the formulas:

Cell	**Formula**
B1	@INDEX(*list*,0,*row*)
B2	@IF(@ISERR(@FIND("–",*step1*,0)), *step1*, @REPLACE(*step1*, @FIND("–",*step1*,0),1,""))
B3	@IF(@ISERR(@FIND("–",*step2*,0)),*step2*, @REPLACE(*step2*,@FIND("–",*step2*,0),1,""))
B4	@IF(@ISERR(@FIND(" ",*step3*,0)),*step3*, @REPLACE(*step3*,@FIND(" ",*step3*,0),1,""))
B5	@IF(@ISERR(@FIND(" ",*step4*,0)),*step4*, @REPLACE(*step4*,@FIND(" ",*step4*,0),1,""))
B6	@IF(@ISERR(@FIND("'",*step5*,0)),*step5*, @REPLACE(*step5*,@FIND("'",*step5*,0),1,""))
B7	@IF(@LEFT(*step6*,2) = "Mc",@REPLACE (*step6*, 1,0,"a"),*step6*)

You can copy the formula in cell B2 to range B3..B4 and edit cell B4, changing the two hyphens to character spaces. Then copy cell B4 to range B5..B6 and edit cell B6, changing the two character spaces to apostrophes. Note that when you edit a formula, *1-2-3* Releases 2.01 and 2.2 display the location of a range name rather than the name itself. So if you edit the formula in cell B1, *1-2-3* Releases 2.01 and 2.2 display the formula @INDEX(A17..B36,0,B9) in the second line of the control panel rather than the formula that you entered, @INDEX(*list*,0,*row*).



	A	B	C	D
1	step1	De Gerlache		
2	step2	De Gerlache		
3	step3	De Gerlache		
4	step4	DeGerlache		
5	step5	DeGerlache		
6	step6	DeGerlache		
7	final	DeGerlache		
8				
9	row			
10				
11	\s	{FOR row,0,@ROWS(list)-1,1,go_on}		
12		{BLANK row}/DSDlist~Psortname~A~G		
13				
14	go_on	{RECALC block}{PUT list,1,row,final}		
15				
16	Lastname	Sortname		

FIGURE 2

Now that you've entered the formulas, use the Range Name Create command to assign the name *block* to range B1..B7.

When cell B9 is empty or contains 0 or a string, the formula @INDEX(*list*,0,*row*) returns the first name in the database—in this case, De Gerlache. The second and third formulas return the name unchanged because De Gerlache contains no hyphen. The formula in cell B4 removes the space. The remaining formulas return the name unchanged because there is no additional space, no apostrophe, and the name doesn't begin with Mc. Try entering the value *12* in cell B9. *1-2-3* displays *Le-Maitre* in cell B1 and *LeMaitre* in range B2..B7. The formula in cell B2 removes the only hyphen.

Now try running the macro. Hold down the MACRO key (Alt on most computers) and press S.

The macro fills the second column of your database with the changed names of column A. The macro then sorts the database conventionally, using column B as the primary sort key. Since the macro makes names like McKay and MacKay identical, the resulting sort may still yield some anomalies. For example, the macro places MacKay after McKay in this example. But at least they're adjacent to one another.

Here's how the macro works:

{FOR row,0,@ROWS(list) − 1,1,go_on} starts a FOR loop. The macro uses the cell named *row* as the counter location and sets the stop number to one less than the number of rows in the database. On the first pass of the loop, the macro puts the start value 0 in *row* and then executes the subroutine *go_on*. Here's what *go_on* does:

{RECALC block}{PUT list,1,row,final} recalculates the range *block* (B1..B7). During the first iteration of the FOR loop, the @INDEX formula in cell B1 returns the first name in the database. The formulas that follow in *block* return that name, successively removing any first and second hyphens, first and second spaces, and first apostrophes. In the last cell, *final*, the formula inserts a lowercase A in Mc when necessary. Then the PUT command copies the string returned by the formula in *final* to the first row of the second column of the database.

On the first iteration of the FOR loop, the FOR command sets the value in *row* to 0. On each subsequent pass of the loop, the macro increases the value in *row* by 1. The macro updates the formulas, and @INDEX returns the second name in the database. The whole conversion process repeats itself and continues until the value in *row* exceeds the FOR command's stop-number argument. When that happens, the FOR loop stops and macro processing continues in cell B12.

{BLANK row}/DSDlist~Psortname~A~G selects /Data Sort Data-Range and indicates the range named *list*. The macro then selects Primary-Key and specifies the column containing *sortname*. The macro specifies an ascending sort order and selects Go to sort the data.

This macro deals with almost every condition that might cause missorting. It is also very flexible. If necessary, you can further adapt it for special cases. For example, to alter names that have three spaces (rather exceptional), insert a row below row 5 and copy the formula from cell B5 into cell B6. Alter the labels in cells A6, A7, and A8 to read *step6*, *step7*, and *step8*, respectively. Select /Range Name Labels Right and indicate range A1..A8 to assign the proper range names to the formulas in their new locations. Then you must check the formulas in the new locations to make sure they refer to the correct ranges. In this case, you must edit cell B7 to refer to range *step6* rather than range *step5*.

On the other hand, if you have no names with two hyphens or two spaces, you can omit the formulas in range B3..B4. That way, the macro will perform a bit faster. Just remember to move the labels and formulas in range A5..B7 to range A3..B5 and to edit the new formula in cell B3 to refer to range *step2*. Also, whenever you insert or remove formulas, you'll have to edit the remaining formulas accordingly. Each formula in range B2..B7 must use the formula directly above it.

MACRO LETTERS

CAN'T ENTER FORMULA

I'm having problems creating the model described in "A Pauper's Notepad" in the March 1989 issue of *LOTUS*. In particular, the figure on page 35 shows cell B28 containing the following formula:

@CELL("address",!{curc})~

When I try to enter this formula, my machine beeps and puts a flashing line under the exclamation point. Are you sure you have it right?

Ralph Eisenschiml
Highland Park, Ill.

The editor replies: The problem is that cell B28 contains a label, not a formula. Enter *'@CELL("address",!{curc})~* in that cell.

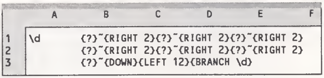
All the entries shown within a macro are labels unless otherwise noted. That means that cell entries that appear to start with @, +, or / actually start with ', ^, or ".

When a cell does contain a formula, the figure shows the result of that formula. We print the results of formulas either in red text or with a highlight to differentiate them from labels. We detail the formulas themselves in the article's text or in a setup box.

MOVING THE CELL POINTER

After reading "Around the Worksheet in 80 Centiseconds" in the April 1989 issue, we developed our own data entry routine [see top of next column].

Our macro automatically moves the cell pointer after each entry. It saves us many keystrokes and a lot of time.

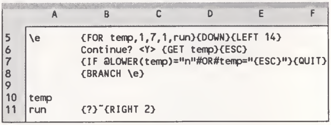


```
        A          B           C          D          E          F
1   \d         {?}~{RIGHT 2}{?}~{RIGHT 2}{?}~{RIGHT 2}
2              {?}~{RIGHT 2}{?}~{RIGHT 2}{?}~{RIGHT 2}
3              {?}~{DOWN}{LEFT 12}{BRANCH \d}
```

Although the macro works well, we wonder how we might improve it. First, is it possible to repeat {?}~{RIGHT 2} so that it doesn't have to be written six times? Second, we now have to press Break and then Escape to stop the macro. Is there a better way to exit?

John P. O'Rourke and Mark Farr
Valley National Bank
Tucson, Ariz.

The editor replies: The following macro addresses both of your questions:



```
        A          B           C          D          E          F
5   \e         {FOR temp,1,7,1,run}{DOWN}{LEFT 14}
6              Continue? <Y> {GET temp}{ESC}
7              {IF @LOWER(temp)="n"#OR#temp="{ESC}"}{QUIT}
8              {BRANCH \e}
9
10  temp
11  run        {?}~{RIGHT 2}
```

To build the model, enter labels as shown. Use the Range Name Labels Right command to assign the labels in column A as range names for the adjacent cells in column B. To run the macro, hold down the MACRO key (Alt on most computers) and press E.

Here's how it works:

{FOR temp,1,7,1,run}{DOWN}{LEFT 14} uses the {FOR} command to call the *run* routine seven times. The *run* routine accepts your entry and then moves the cell pointer two cells to the right. After the macro processes the *run* routine seven times, the macro moves the cell pointer down one row and then 14 cells to the left.

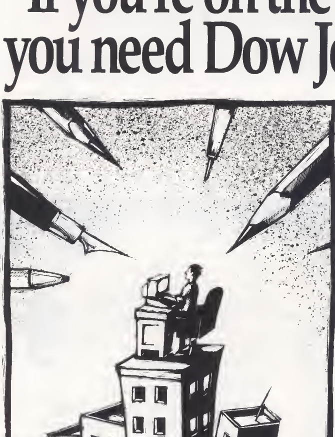
Your macro is essentially replaced by this line of macro code (cell B5), the *run* routine (cell B11), and the counter cell named *temp* (B10). The code in cells B6 and B7 offers an alternative to pressing Break to exit the macro. The trade-off here is an additional keystroke for every line of data entry. If an extra keystroke is unacceptable, skip these lines and go directly to the {BRANCH \e} command. Then continue to use BREAK to stop macro processing. If you don't mind an extra keystroke, create the macro as it's shown. Here's what the rest of the macro does:

Continue? <Y> {GET temp}{ESC} asks you if you want to continue. The macro then pauses for your input and stores your keystroke in the cell named *temp*. The Y between the greater-than and less-than signs is the default answer. So pressing the Return key has the same effect as pressing Y.

{IF @LOWER(temp)="n"#OR#temp="{ESC}"} **{QUIT}** determines whether *temp* contains N, n, or {ESC}. If it does, macro processing stops.

{BRANCH \e} loops control to the top of the *\e* routine. ■

If you're on the firing line, you need Dow Jones online.



People are counting on you.

Relying on your speed. Your smarts. Your information.

Feel the heat? Not when you're online with Dow Jones News/Retrieval®–the business news and information service from the publisher of *The Wall Street Journal*, Dow Jones & Company, Inc.

With News/Retrieval it's easy to screen sales prospects, identify acquisition candidates and research competitors. Stay ahead of events and track fast-breaking situations like never before. Spot the trends that signal opportunity. Spark new ideas, develop incisive strategic plans, or compile a wealth of financial data to give yourself a unique information advantage.

Only News/Retrieval gives you news just seconds after it hits the Dow Jones newswires; exclusive access to the full text of *The Wall Street Journal,* and fingertip access to information from over 185 publications, including *Fortune, Forbes* and *Business Week;* D&B reports; detailed profiles of over 5,000 companies; and more–to help you make cool, confident decisions.

Online has never been easier–one service even lets you enter search commands in plain English!

Discover how easy it is on the firing line when you're online with News/Retrieval. For more information or to order now ($29.95 includes 3 free* hours), call today.

1-800-225-3170, Ext 667.

DOW JONES
NEWS/RETRIEVAL®
Online with business.℠

*Offer expires January 31, 1991. New domestic and Canadian subscribers only. Free time is per account and must be used within 30 days of receipt of passwords. Some services have special charges that are excluded from the free time offer. © 1989 Dow Jones & Company, Inc. All rights reserved.

FOR DEVELOPERS

A STEP UP FOR POWER USERS

Create add-ins with Lotus's *Add-In Toolkit* for Release 3.

BY JEFFREY KAHN

An important new player that recently joined the *1-2-3* product team promises to increase your ability to customize a worksheet. Last September Lotus Development Corp. released the *Add-In Toolkit* for Release 3. With it, template developers can create custom @functions, macro command keywords, and menu-driven applications for *1-2-3* Release 3. And equally important, the *Toolkit* compiles your programs into files that are tamperproof.

People who write add-ins for Releases 2.01 and 2.2 must use assembly language to create their add-ins. The only other choice they have is to customize spreadsheets with Lotus's macro command language. The *Add-In Toolkit* provides Release 3 developers with a middle ground between macros and assembly-language programs. Advanced macro writers and professional programmers can use the *Toolkit* to extend *1-2-3*'s increasingly sophisticated capabilities.

This article assumes that you are an experienced template developer. It will help if you have some familiarity with a programming language such as BASIC, Pascal, or C. We'll use simple examples in this article to illustrate the variety of capabilities available in this product, but be aware that the *Add-In Toolkit* provides a full-featured, developmental language capable of creating very sophisticated applications.

A TOUR OF THE TOOLKIT

The *Add-In Toolkit* includes four main parts: the Lotus Programming Language (LPL) and compiler, a library of program modules that support *1-2-3* Release 3 functions, an editor for writing add-in programs, and a debugger that lets you track down errors and gain insight into LPL's syntactical requirements.

The Lotus Programming Language

Lotus didn't tie LPL to *1-2-3* Release 3 or to any particular software product. Rather, a separate software library dedicated to each product provides communication between LPL programs and that product. This design affords greater program modularity across software platforms. And it will allow programmers to reuse code when they write add-ins for software products that new LPL libraries will support in the future.

The LPL compiler converts the text of your program into a compiled add-in file. You load the add-in file into memory by using *1-2-3*'s add-in menu commands. You can access the add-in menu from within *1-2-3* by pressing the ADDIN key (Alt-F10 on most computers).

The process of creating an add-in is different from writing and executing a macro. With a macro, you enter a command as a label in a worksheet cell. When *1-2-3* runs the macro, it checks each label for syntax. If the syntax is valid, *1-2-3* performs the command. In contrast, the *Toolkit*'s compiler checks the syntax of the instructions included in your program before you can run it. If the compiler finds any problems there, it returns an error message. If

---

Jeffrey Kahn programs spreadsheet add-ins and supplementary library modules for Lotus's Add-In Toolkit *and is editor of* Technically Speaking, *a journal for users of the* Toolkit.

JOSEPH GAST

the syntax is correct, the compiler creates an add-in file.

Remember that the compiler merely makes sure your code is syntactically correct. That means it checks only for typographical errors, invalid statements, and incompatible variable types. The compiler cannot guarantee your program will do what you want it to. Syntactically correct applications are still capable of generating run-time errors. As with macros, you can detect these errors only after you test the application.

The Libraries

LPL's built-in routines manage data and control program flow. Your add-in programs require one or more library modules, or routines, to help them work within the *1-2-3* spreadsheet. The *Toolkit* includes library modules that allow add-ins to perform just about every operation you can perform manually within *1-2-3*. A library module is an object file (already compiled) that the *Toolkit* compiler can incorporate into your add-in. There are modules to manipulate cells, ranges of cells, entire worksheets, worksheet files, and global settings. Other modules let your add-in perform the equivalent of menu commands. You can also call module routines that perform the equivalent of @function calculations.

There is even a special library routine called *MacroRun*. It lets your add-in run any existing macro or execute a macro that you define within your program. This means you can copy existing macros into your add-in program, and after compiling, you can run them from within the add-in.

The Editor and the Debugger

To create LPL program source files, you can use any editor that produces ASCII text files. But the *Toolkit* editor has distinct advantages.

The *Toolkit* editor runs in DOS and in OS/2 version 1.1 or higher. It allows you to edit multiple files simultaneously. And best of all, you can compile LPL source files directly into add-in files from within the editor. The resulting compiled files have a .PLC extension. This distinguishes them from Release 2.01 add-ins, which have an .ADN extension.

The *Toolkit*'s debugger, which runs only under OS/2, lets you step through your add-in programs one instruction at a time. That way you can watch what happens in *1-2-3* as your program executes each step.

The debugger is similar to ones that are supported by other programming languages. It's like using Step mode to walk through macros, only it's more versatile. For example, the debugger lets you set break points, which means you can run your program until it comes to a designated statement or procedure or until it changes the value of a specified variable.

The debugger shows you each statement as it executes. You can also view at any time the current values of the variables in your program.

CREATING A CUSTOM @FUNCTION

Add-in programs consist of three basic elements. The first element consists of statements that detail where the program starts and where it ends. The second element is the body of the program. This is where you create the commands that perform the desired operations. The third element is a signal-handling mechanism by which your program detects and handles errors and exceptional conditions.

The ability to handle exceptions in LPL is greater than the capability of {ONERROR}, the corresponding macro command. For example, an input routine that creates menus can return a signal indicating which key, ESC or CTRL-BREAK, the user pressed to cancel the prompt.

For the rest of this article, we'll discuss two sample add-ins we've developed to illustrate the potential of LPL.

The Factorial @Function

The first add-in we've created is an @function that calculates a value's factorial. The factorial of a value is the product of all the positive integers from 1 to that value, inclu-

```
use register                                              -- Use library that supports registration
                                                          -- of @functions or macros.

register("FACTORIAL",atfunction)                          -- Register the @function.

procedure factorial (integer x) returns (float result) signals (err) is

   result = 1                                             -- Initialize the result to 1.
   integer i                                              -- Declare an integer variable i.

   if x < 0 then                                          -- Signal ERR if input is less
      signal err                                          --   than 0.
   elseif x = 0 then
      return                                              -- Return 1 if input equals 0.
   else
      for i = 2 to x loop                                 -- Loop x times
         result = result * i                              --   adding the value of the counter i
      end loop                                            --   to result on each iteration.
   end if

end procedure factorial
```

FIGURE 1. The Lotus Programming Language code used to create the @FACTORIAL function

sive. For example, the factorial of 3 is 6 because 1*2*3 = 6. By definition, the factorial of 0 is 1.

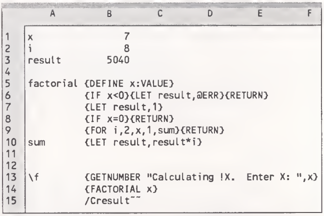
The code for our @FACTORIAL add-in is listed in figure 1. The first line tells the compiler this program will use one or more routines from a library named REGISTER. The next line uses that library's register function to define our factorial procedure, which occupies the next 12 lines, as an @function. The register function alerts *1-2-3* to each of the @functions you've created in your program. So, in this case, after you attach the add-in, *1-2-3* will call the compiled factorial procedure whenever the worksheet recalculates an @FACTORIAL formula.

Next come the procedure declarations. These include information about the number, names, and types of inputs, return values, and signals. Signals are a special form of return that LPL provides to handle error conditions and exceptional situations.

In our factorial example, we define @FACTORIAL so that it accepts a single positive integer. We will also tell it to return ERR if the input is negative. For the sake of simplicity, however, we won't worry about the overflow error that a large input value would cause.

After you enter an @FACTORIAL function into the worksheet, *1-2-3* checks the type and number of actual input arguments against this definition when it calculates @FACTORIAL. If a mismatch occurs, as with @FACTORIAL(1,"fred"), *1-2-3* won't accept the formula just as it won't accept the invalid formula @ROUND(1). If there is no mismatch, *1-2-3* assigns the actual input integer to the factorial procedure's input variable, *x*, and then calls the factorial procedure to calculate the result.

The @function begins by setting the variable, *result*, equal to 1. It then defines the variable *i*. You define variables in LPL the same way you do in C and Pascal. You introduce a variable with the variable's type followed by the variable's name. In this instance, the variable *i* will accept only integers and will serve as a counter.



```
        A            B          C          D          E          F
 1   x                 7
 2   i                 8
 3   result         5040
 4
 5   factorial {DEFINE x:VALUE}
 6             {IF x<0}{LET result,@ERR}{RETURN}
 7             {LET result,1}
 8             {IF x=0}{RETURN}
 9             {FOR i,2,x,1,sum}{RETURN}
10   sum       {LET result,result*i}
11
12
13   \f        {GETNUMBER "Calculating !X.  Enter X: ",x}
14             {FACTORIAL x}
15             /Cresult~~
```

FIGURE 2. The macro equivalent of the @FACTORIAL formula, which was generated with the code in figure 1

We use an IF statement to handle negative input, zero, or a positive integer. If the input value *x* is valid, a FOR loop computes the product of all the integers. Note the similarity to the macro commands {IF} and {FOR}. LPL provides a cleaner and more-flexible syntax. Note that you use the word *end* to tell the compiler where the FOR loop, the IF/ELSE section, and the factorial procedure end.

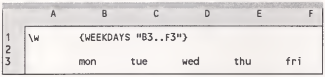
Figure 2 shows an example of how you might construct a macro to perform this operation.

CREATING A CUSTOM COMMAND KEYWORD

Figure 3 contains a program that creates a new macro keyword. Our custom macro command, {WEEKDAYS}, writes the abbreviated names of the five weekdays across

```
use register,range,utility                   -- Use libraries that support
                                             --   the registration of macros, the
                                             --   use of ranges, and the production
                                             --   of beeps.

type DayOfWeek is oneof(Mon,Tue,Wed,Thu,Fri) -- Define possible weekdays.
register("WEEKDAYS",macro)                   -- Register the weekday
                                             --   @function.

procedure weekdays (string wrange) is
 DayOfWeek days                              -- Declare a variable days that
 begin                                       --   will be one of the weekdays.
  range [wrange] fillrange                   -- Identify a range based on
                                             --   the input string.  Call it wrange.
  for integer column = 1 to 5 loop           -- Loop through all weekdays
   days = DayOfWeek(column)                  --   assigning the next element
                                             --   to the variable days.
   fillrange[1,column,1] = string(days)      -- Write the days variable as a
                                             --   label into the range using
                                             --   the column counter as an
                                             --   offset.

  end loop
 end
 except on others do                         -- If an error occurs between
  beep(250,500)                              --   the begin and end statements
 end except                                  --   sound a beep.
end procedure weekdays
```

FIGURE 3. The LPL code used to define the {WEEKDAYS} macro command keyword



```
        A         B         C         D         E         F
1  \w        {WEEKDAYS "B3..F3"}
2
3            mon       tue       wed       thu       fri
```

FIGURE 4. The \w routine uses the {WEEKDAYS} command to enter the days of the week as labels in range B3..F3.

columns in the first row of a specified range.

The program begins by specifying the three libraries it will need—REGISTER, RANGE, and UTILITY. It then declares a set of labels. This set includes the days of the workweek. The program calls that set *DayOfWeek*. This set is Enumerated Type, which is a user-defined data type that contains the members of a fixed, ordered list. User-defined types are always global. Like global variables, they are declared before any procedure. That means that any procedure in your program can use them. Variables declared inside a procedure are local variables and are only available within that procedure. Thus the variable *days*, of type *DayOfWeek*, is a local variable. With macros, named cells are like global variables. There's really no equivalent of a local variable in macro programming.

The procedure *weekdays* declares the range *fillrange*. This is just another name for the range that *1-2-3* sends to the program or procedure via the @function; it takes the form of an address-string argument (*wrange*). For each of five passes through the loop, the procedure assigns the next member of the enumerated type to the *day* variable.

The procedure then assigns the string equivalent of the *day* variable to the next cell in the range. Note that you address individual worksheet cells inside ranges by their [*sheet,column,row*] location. This is similar to the offset arguments used for the @INDEX function, except that range offsets start with 1 instead of 0.

Finally, observe that the entire set of operations is contained between a BEGIN and an END. This lets a single exception handler generate a beep for any of the signals that might arise while this procedure executes. For example, the procedure might raise a signal, or message, called *InvalidRange* if it tries to define a range that doesn't exist, such as range IZ0..PP9. It could raise an *OutOfMemory* or *ProtectedCell* signal when it writes labels into the cells of a range. Any of these conditions will cause your program to sound a beep. The BEEP(250,500) command sounds a beep with a frequency of 250 hertz for 500 milliseconds.

Figure 4 shows how our custom keyword works. We ran the macro shown in cell B1, and *1-2-3* entered the resulting labels in range B3..F3. ■

Let us know if you're interested in seeing more articles on the Add-In Toolkit. *Send your comments to: Techniques Editor,* LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139-9123.*

STORE YOUR *LOTUS* DATA FOR YEARS...

In handsome library cases designed expressly for *LOTUS* subscribers. Cases are deep red with embossed silver lettering. Each is sturdily constructed and holds one year (12 issues) of *LOTUS*.

1 for $7.95, 3 for $21.95 or 6 for $39.95.

(Plus $1 per case for postage and handling within the U.S., or $2.50 per case shipped to Canada and beyond. PA residents add 6% sales tax.)

MAIL TO:
Jesse Jones Industries
PO Box 1165, Kendall Square
Cambridge, MA 02142

Please send me ______ *LOTUS* library cases.
Enclosed is my check or money order payable to Jesse Jones (in U.S. currency) for $__________
or charge my ☐ VISA ☐ MasterCard ☐ AMEX.

NAME

SIGNATURE

CARD NO.

EXPIRATION DATE

ADDRESS (Street address only)

CITY STATE ZIP

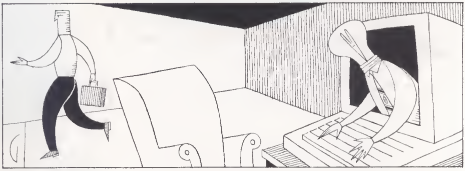
Satisfaction guaranteed by Jesse Jones Industries or money refunded. Please allow up to six weeks for delivery.

MACRO BASICS

MACROS CAN MAKE DECISIONS

Do you use macros just to record and play back keystrokes? Maybe it's time to let your macros think for themselves

BY DANIEL GASTEIGER



JOSEPH GAST

Storing keystrokes in macros is a great time saver. When you need to repeat a label in several cells, you can type it in one cell, assign it a macro name, then reproduce it instantly in any other cell by pressing two keys. In the same way, your macro can repeat menu sequences and cell-pointer movements.

As you press macros into greater service, you expect them to perform more complex tasks. And, while I've repeatedly told readers of this column that macros can replace the user at the keyboard, I've deliberately omitted one very important observation: Users make decisions. For macros to replace you at the keyboard, they also must be able to make decisions.

A SIMPLE QUESTION

Macros can, in fact, decide what to do based on information in the worksheet. A macro might, for example, determine whether the current cell contains an entry. If the cell does contain an entry, the macro might move the cell pointer down a row. If the cell doesn't contain an entry, the macro might copy information from another cell to the current cell. The point is, a macro can move the cell pointer or copy data without your intervention.

Consider the following scenario: Your worksheet contains a column of values interspersed with labels. You wish to remove all the labels from the column, leaving the values.

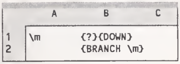
Without macros, you'd probably start with the cell pointer at the top of the column. You'd determine whether the current cell contains a label. Then you'd either erase the cell and move the pointer down, or you'd move the pointer down without erasing the cell.

You can write a macro that approaches the task in the same way. The macro must be able to ask—and answer—the question, Does this cell contain a label? More important, there must be a mechanism that makes the macro change course when the answer is yes. That mechanism is the macro {IF} command.

BRANCHING

Typically, macro instructions execute from left to right within a cell. The macro processor follows whatever instructions appear in a cell, then looks to the cell below for more commands. Processing continues until the macro processor encounters a blank cell, a cell with a nonlabel entry, a {QUIT} command, or its older equivalent, the /XQ command.

Certain commands divert the macro processor from its linear path. For example, the command {BRANCH skip} tells the macro processor to find further instructions in a cell named *skip*. In past installments of this column, I've used the {BRANCH} command in a very simple macro that assists with data entry. That macro appears to the left.



	A	B	C
1	\m	{?}{DOWN}	
2		{BRANCH \m}	

To create this macro, enter the labels as shown. Then use the Range Name Labels Right command to assign the label in cell A1 as the name for cell B1. To try the macro, move the cell pointer to cell B5, hold down the MACRO key (Alt on most computers), and press M.

Because the macro's first command is {?}, the display remains static. The {?} command suspends macro processing until you press the Return key. You can type labels, values, or formulas, and even access menus. However, when you press Return, the macro processor immediately

---

Daniel Gasteiger is a 1-2-3 *and* Symphony *consultant and a contributing editor to* LOTUS.

processes the next instruction in the macro.

The macro's second command is {DOWN}, which is equivalent to pressing the DownArrow key. Assuming you've typed a label or a value, the macro enters what you typed into the current cell and moves the cell pointer down.

The macro's last command is {BRANCH \m}. When the macro processor encounters this command, control transfers to the cell named *\m*—the first cell of the macro. You can type another entry and press Return, and the macro will repeat itself to accept as many entries as you wish to make. Stop the macro by holding down the Control key and pressing Break. Then clear the resulting error by pressing Return or Escape.

CONDITIONAL BRANCHING

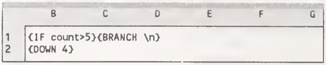
The branching that takes place in the data-entry macro is quite simple. Unless some external force interrupts it, the macro processor repeats this small collection of steps indefinitely—branching back to its own beginning after each entry you make.

If the {BRANCH} command were the only means to change a macro's course, the macro would always repeat the same sequence of steps, regardless of the context. This is where the {IF} command enters the picture.

The {IF} command has the format {IF *condition*}. The argument *condition* can be any expression, but generally it is a conditional statement that returns either 0 or 1. For example, in the command {IF A1 = 10}, the argument returns 1 if cell A1 contains the value 10 and 0 if cell A1 contains any other value. In other words, 1 means true and 0 means false.

When the macro processor encounters an {IF} command whose condition argument returns 1, processing continues through further instructions in the {IF} command's cell. When a condition argument returns 0, the macro processor skips subsequent instructions in the cell and proceeds to the commands in the following cell.

The following figure shows two steps that illustrate the behavior of a macro {IF} command:

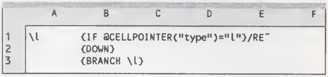


```
      B          C          D          E          F          G
1  {IF count>5}{BRANCH \n}
2  {DOWN 4}
```

When the macro processor encounters the {IF} command, it determines whether the value in *count* is greater than five. If so, the {BRANCH} command transfers macro processing to the cell named *\n*. If *count* is less than or equal to 5, the macro skips the {BRANCH} command and processes the {DOWN} command in the following cell.

ERASING LABELS

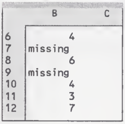
Now let's get back to the example that I proposed at the beginning of this article. The illustration that follows shows a macro that uses an {IF} command in order to determine whether the current cell contains a label:



```
        A          B          C          D          E          F
1  \l         {IF @CELLPOINTER("type")="l"}/RE~
2             {DOWN}
3             {BRANCH \l}
```

To create the macro, start in a blank worksheet and enter the labels as shown. Then use the Range Name Labels Right command to assign the label in cell A1 as the name for cell B1. *Symphony* users should substitute the characters {MENU}E~ for the characters that follow the {IF} command in cell B1.

Enter data as shown below in order to provide a range in which to test the macro. To see the macro in action, simply move the cell pointer to cell B6, hold down the MACRO key, and press L. This macro works very quickly, and you should stop it when it finishes processing the column of data. All you have to do is hold down the Control key and press Break, then clear the resulting error by pressing the Escape or Return key.



```
          B        C
6          4
7   missing
8          6
9   missing
10         4
11         3
12         7
```

Here's what the macro does:

{IF @CELLPOINTER("type") = "l"}/RE~ erases the current cell if the cell contains a label. The function @CELLPOINTER("type") returns the label *l* if the current cell contains a label. Therefore, the expression @CELLPOINTER("type") = "l" returns the value 1 when the current cell contains a label; the macro processor proceeds with the Range Erase command and deletes the cell's contents.

If the current cell doesn't contain a label, the @CELLPOINTER function returns some label other than *l* (*b* if the cell is blank, *v* if it contains a value or a formula). The expression @CELLPOINTER("type") = "l" returns 0, so the macro processor ignores the Range Erase command and proceeds to the command in cell B2.

In any case, the macro processor follows the command in cell B2 and moves the cell pointer down. Then the {BRANCH} command that's in cell B3 directs the macro processor back to the beginning of the macro. The loop continues indefinitely until you stop it by pressing the Control-Break key combination.

A conditional branching statement doesn't have to be very complex to obtain a useful result. In this case, the branching takes place within a single cell. By making its own decision, the macro processor can bypass a few simple macro commands. But as suggested earlier, you can use the {IF} command in conjunction with a {BRANCH} command to dramatically redirect a macro's processing. You'll need to experiment with your own macros to determine just how much responsibility you can give to your conditional branching statements. ■

HERE'S THE MISSING LINK

Multiple-file applications in Release 3 let you permanently connect data in one file with data in another.

BY DAVID J. BOOKBINDER

The concept of linking data in one file to data in another file is not new. *1-2-3* has always contained File Combine commands that enable you to pull information from subordinate worksheets into a master worksheet. Unfortunately, these commands are limited. For example, when you edit data in a subordinate file, the master file does not automatically reflect the change. Consequently, each time you update data, you must remember to reissue the appropriate File Combine commands for each changed range or use a macro to do so.

True file linking, available in *1-2-3* Release 3, overcomes these limitations and offers many advantages. Two files are linked when a cell in one worksheet file refers to a cell in any other worksheet file in memory or on disk. Just as you use an ordinary cell reference in a formula or macro, you can use a range reference in a file link. When you change the data, Release 3 updates the link for you.

In addition, by allowing you to link files in memory to files on disk, Release 3 nearly eliminates memory constraints. A model that wisely uses file linking can be as large as the available disk storage, instead of being limited to the amount of available RAM.

But before we get ahead of ourselves, it's important to distinguish between a multiple-file application and a multidimensional worksheet. It's also important to know when to use which.

A multidimensional worksheet is one file that contains several worksheets. You'll want to base an application on a single multidimensional worksheet file if everyone who uses the application has access to the same file and is entitled to have access to all the data in it. Also, the application must not be too big to fit into memory. For more on the 3-D worksheet, see the article "Meet the Multidimensional Worksheet" in the January issue.

On the other hand, a multiple-file application can work with more than one file at once. The files can be in memory or on disk, and each file can contain multiple sheets. Such an application is ideally suited to data that more than one person manipulates or data that more than one application requires. The multiple-file solution is also handy when an application would otherwise be too large to fit into available memory.

A multiple-file application makes it easy for a group of people to share data. For example, suppose several department managers need financial information from a database that is updated weekly. Instead of someone in each department rekeying values from the database into the departmental worksheet, each worksheet can contain file links that refer to the database file. Whenever the database is updated, each manager issues a single command to update the file links.

To simplify the presentation of multiple-file concepts, we've selected a concise model. Once you master the basics of file linking, you'll be prepared to develop your own more intricate applications.

NAVIGATE AMONG FILES

When a Release 3 worksheet file is in memory, it is known as an active file. In theory, Release 3 lets you have a maximum of 256 files active at once. The actual limit, however, depends on available memory and operating system constraints. Up to 256 worksheets can be distributed among all active files.

Just as you can pull out several file folders, lay them on a desk, and leaf through them, you can read several worksheet files into memory and then "flip" through them. To bring a file into memory, you use the File Open command. This command lets you specify whether the file should appear before or after the current file, which is the one that currently contains the cell pointer.

Once you have opened several files, you need ways to navigate among them. The table on page 37 summarizes the key combinations that move the cell pointer from one active file to another. When you move the cell pointer from file to file, you'll notice that the name of the current file appears in the lower-left corner of the screen. This helps you remember which file you are in when you're navigating.

When you finish working with an active file, you may want to save it to disk and then delete it from memory. Saving a file is probably second nature to you by now: You select /File Save and enter a file name. If you have previously saved the file, Release 3 presents three options: Cancel, Replace, and Backup. To abort the process of saving the file, select Cancel. To replace an existing file on disk with the copy in memory, select Replace. Finally,

LOU JONES

to create two files representing the last two versions of the file, select the Backup option. This command first renames the file on disk by changing the file extension from .WK3 to .BAK, and then saves the file in memory by using the existing file name and the .WK3 extension. In most cases, you'll probably want to select Replace.

The process of saving files is slightly different when more than one file is in memory. You can save either all modified files at once or only the current file. To save all modified files at once, select /File Save and press Return. To save only the current file, select /File Save, press the EDIT key or the Escape key to display the current file name, and then press Return. In both cases, you'll be presented with the three save options described in the previous paragraph.

The File List Active command displays a full-screen list of all active files. If you highlight a particular file name, *1-2-3* displays at the top of the screen the date and time the file was created, its size, and the number of worksheets in the file. In addition, *1-2-3* indicates whether or not a file has been modified since you last saved it. It's good practice to list the active files before you delete a file from memory.

To delete an active file from memory, you use the Worksheet Delete File command. This command does not affect the file currently stored on disk or any other files in memory.

CREATE FILE LINKS

Now that you're familiar with moving files in and out of memory and navigating among files, you're ready to explore the fundamentals of file linking. To create a file link, you specify two pieces of information: a file reference and a range specification. The file reference, which you enclose in double angle brackets (<< >>), can be a file name or a file path plus a file name. If the file reference contains only the file name, *1-2-3* searches only the current directory for the file. If the referenced file is not in the current directory, the file link returns ERR, indicating that you must include a path. The range specification, which immediately follows the file reference, can be a single-cell range, a range of cells, or a named range. If the link is to a multiple-worksheet file, the range can include a worksheet letter. The range you specify can be relative, absolute, or mixed.

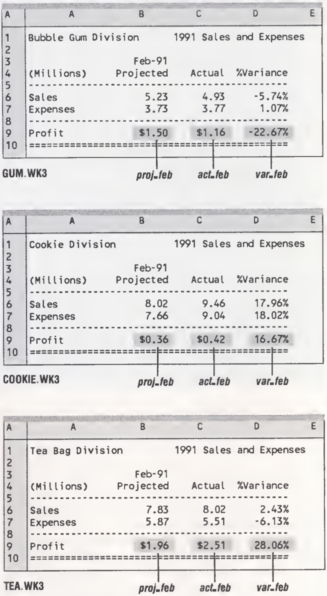
Consider a few examples of file links. If you enter *+<<gum.wk3>>proj_feb* in the file TEA.WK3, you create a link to a range named *proj_feb*, which is located in the file GUM.WK3, which in turn is in the current directory. Similarly, to sum projected February sales in the file C:\SALES\GUM.WK3 and to add to that total the value of the cell named *factor* in the target file, you enter the following formula:

```
@SUM(<<C:\SALES\GUM.WK3>>proj_feb)+factor
```

The file containing the cell or range referred to in the file link is called the source file, since it's the source of the data. In the example above, the source file is GUM.WK3. The file containing the reference is called the target file since it receives the values from the source files. In the example, the target file is TEA.WK3. When you alter a source-file cell, *1-2-3* updates target-file cells that are linked to that cell.

BUILD DIVISIONAL WORKSHEETS

Now let's work with a multiple-file application. To begin, we'll build several worksheets that will eventually be combined into a consolidation worksheet for the hypothetical business Manifest Destiny. The company's three divisions produce paper fortunes for bubble gum wrappers, fortune cookies, and tea bag tags.



```
A  |      A              B            C          D         E
1  | Bubble Gum Division          1991 Sales and Expenses
2  |
3  |                   Feb-91
4  | (Millions)      Projected     Actual   %Variance
5  | -----------------------------------------------
6  | Sales                5.23       4.93      -5.74%
7  | Expenses             3.73       3.77       1.07%
8  | -----------------------------------------------
9  | Profit              $1.50      $1.16     -22.67%
10 | ===============================================
```

```
A  |      A              B            C          D         E
1  | Cookie Division              1991 Sales and Expenses
2  |
3  |                   Feb-91
4  | (Millions)      Projected     Actual   %Variance
5  | -----------------------------------------------
6  | Sales                8.02       9.46      17.96%
7  | Expenses             7.66       9.04      18.02%
8  | -----------------------------------------------
9  | Profit              $0.36      $0.42      16.67%
10 | ===============================================
```

```
A  |      A              B            C          D         E
1  | Tea Bag Division             1991 Sales and Expenses
2  |
3  |                   Feb-91
4  | (Millions)      Projected     Actual   %Variance
5  | -----------------------------------------------
6  | Sales                7.83       8.02       2.43%
7  | Expenses             5.87       5.51      -6.13%
8  | -----------------------------------------------
9  | Profit              $1.96      $2.51      28.06%
10 | ===============================================
```

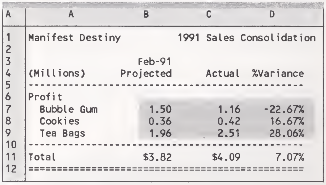
FIGURE 1. The divisional files GUM.WK3, COOKIE.WK3, and TEA.WK3. Named ranges, shown in shaded cells, are used by file links in the consolidation worksheet.

Figure 1 shows the divisional worksheets for the month of February. The file GUM.WK3 contains the data for the Bubble Gum Division, showing the projected and actual sales, expenses, and profit, as well as the variances between projected and actual amounts expressed as a percentage. The consolidation worksheet, shown in figure 2, contains file links to the divisional worksheets and provides a view of the entire enterprise.

To build the worksheet file for the Bubble Gum Division, follow the steps in the setup box for the divisional worksheets at the bottom of this page. Then select /File Save, type the name *gum*, and press Return to save the file as GUM.WK3.

Now use the GUM.WK3 file as a template to create files for the Cookie and Tea Bag divisions. To create a file for the Cookie Division, begin in the file GUM.WK3. Enter the label *Cookie Division* in cell A1. Then select /Range Erase and specify range B6..C7. *1-2-3* displays $0.00 in range B9..C9 and ERR in the *%Variance* column. Select /File Save and enter *cookie* to save the file as COOKIE.WK3. Similarly, to create the Tea Bag Division worksheet, enter *Tea Bag Division* in cell A1 and save the file as TEA.WK3.

Now read the file COOKIE.WK3 into memory. Select /File Open Before, highlight the file name COOKIE.WK3, and press Return to read that file into memory in front of the TEA.WK3 file. Be sure to use the File Open command, not the File Retrieve command. The File Open command reads the selected file into memory without disturbing other files in memory, while the File Retrieve command replaces the current active file with the file you specify.



```
A  |     A              B          C          D
1  |Manifest Destiny          1991 Sales Consolidation
2  |
3  |                  Feb-91
4  |(Millions)     Projected     Actual  %Variance
5  |-------------------------------------------
6  |Profit
7  |  Bubble Gum        1.50       1.16    -22.67%
8  |  Cookies           0.36       0.42     16.67%
9  |  Tea Bags          1.96       2.51     28.06%
10 |-------------------------------------------
11 |Total             $3.82      $4.09      7.07%
12 |===========================================
```

FIGURE 2. The consolidation worksheet contains formulas, located in the shaded area, that use file links to the files shown in figure 1. For example, cell B7 contains the formula +<<GUM>>proj_feb, which instructs *1-2-3* to get the value of the named range *proj_feb* in the file GUM.WK3. Similar formulas pull projected, annual, and variance values from the files COOKIE.WK3 and TEA.WK3.

KEY COMBINATIONS FOR CELL-POINTER MOVEMENT

Key Combination	Description
Next File (Ctrl-End Ctrl-PgUp)	Moves the cell pointer to the active file behind the current file
Previous File (Ctrl-End Ctrl-PgDn)	Moves the cell pointer to the active file in front of the current file
First File (Ctrl-End Home)	Moves the cell pointer to the first active file
Last File (Ctrl-End End)	Moves the cell pointer to the last active file
GOTO (F5)	Moves the cell pointer to any specified cell in any active file

HOW TO SET UP THE DIVISIONAL WORKSHEETS

1. Releases

The model runs in *1-2-3* Release 3.

2. Default settings

Format: , 2

/Worksheet Global Format, type a comma, and press Return

Column width: 10

/Worksheet Global Col-Width, enter 10

3. Individual column width

Column	Width
A	15

Position the cell pointer in column A. Select /Worksheet Column Set-Width and enter 15.

4. Cell formats

Format	Range
Date 3	B3
Currency 2	B9..C9
Percent 2	D6..D9

For example, to set the format of cell B3, select /Range Format Date 3, and indicate cell B3.

5. Labels

Enter the labels shown in rows 1 and 4 and in column A of file GUM.WK3, shown in figure 1. Be sure to precede the entries in cells C1 and A4 with an apostrophe. Right-align the labels in range B4..D4: Select /Range Label Right and indicate range B4..D4. Enter \- in cell A5. Copy cell A5 to ranges B5..D5 and A8..D8. Enter \= in cell A10. Copy cell A10 to range B10..D10.

6. Values

Enter the values shown in range B6..C7 of file GUM.WK3 (figure 1).

7. Range names

Name	Range
proj_feb	B9
act_feb	C9
var_feb	D9

For example, to name cell B9, select /Range Name Create, enter *proj_feb*, and specify cell B9.

8. Enter and copy formulas

Cell	Formula
B3	@DATE(91,2,1)
B9	+B6−B7

Copy cell B9 to cell C9.

D6 (C6−B6)/B6

Copy cell D6 to cells D7 and D9.

Next enter the values shown in range B6..C7 of the file COOKIE.WK3 shown in figure 1. Then press the key combination Ctrl-End Ctrl-PgUp to move the cell pointer to the file TEA.WK3. Enter the values shown in range B6..C7 of the file TEA.WK3 shown in figure 1.

Now select /File Save and press Return to save all modified files. Select Replace. This command simultaneously saves COOKIE.WK3 and TEA.WK3.

Next read GUM.WK3 into memory. Press the key combination Ctrl-End Ctrl-PgDn to move the cell pointer to the file COOKIE.WK3. Select /File Open Before, highlight the name GUM.WK3, and press Return to read GUM.WK3 into memory in front of COOKIE.WK3.

All three divisional files are now active. To verify this, select /File List Active. *1-2-3* displays the three file names COOKIE.WK3, GUM.WK3, and TEA.WK3. Press any key to return to the worksheet.

BUILD THE CONSOLIDATION FILE

Figure 2 shows what the consolidation worksheet will look like after you build it. This worksheet uses file links to display and summarize both projected and actual profit figures from each division's file. As in the division worksheets, column B shows projected values, column C shows actual values, and column D shows the variance between projected and actual values as a percentage.

The formulas in cells B7..D9 contain links to named ranges in the various divisions' worksheet files. For example, the formula in cell B7, which calculates the Bubble Gum Division's projected profit, is +<<GUM.WK3>> *proj_feb*. This formula links cell B7 in the consolidation file with the range named *proj_feb* in the file GUM.WK3.

The formulas in row 11 perform simple calculations on the linked cells. Cells B11 and C11 contain @SUM formulas that total projected and actual profit figures for all divisions. These formulas include an extra row above and below the actual values to be summed. This ensures that the ranges will automatically adjust to include any new row you might insert between rows 6 and 10. Cell D11 calculates the variance between Manifest Destiny's projected and actual profit as a percentage of the projected value.

If the divisional files are still in memory, move the cell pointer to the file GUM.WK3, select /File New Before, and enter the file name DESTINY. If the divisional files are not in memory, read them into memory before you create the file named DESTINY. Select /File Retrieve and indicate TEA.WK3, select /File Open Before and indicate COOKIE.WK3, and then select /File Open Before again to read GUM.WK3 into memory.

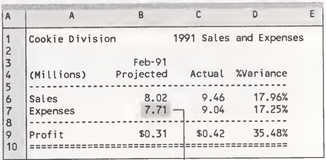
To create the consolidation worksheet, follow the steps in the setup box on page 37 for the consolidation worksheet. When you have completed these steps, select /File Save, press the Edit or Escape key to display the current file name, press Return, and then select Replace to save the file DESTINY.WK3.

TEST THE CONSOLIDATION

To see how *1-2-3* updates file links, let's modify a value in the file COOKIE.WK3. Press the GOTO key and enter <<*cookie*>>*B7*. Press the EDIT key, type *+0.05*, and press Return to add $50,000 to the projected February expenses for the Cookie Division. *1-2-3* automatically updates cells B9, D7, and D9, as shown in figure 3a.

Now see how *1-2-3* has updated the file DESTINY.WK3. Move the cell pointer to the DESTINY file. Press the GOTO key and enter <<*destiny*>>. *1-2-3* has automatically updated the file links in cells B8 and D8 and recalculated the formulas in cells B11 and D11, which depend on those cells. Figure 3b shows the results of these changes.

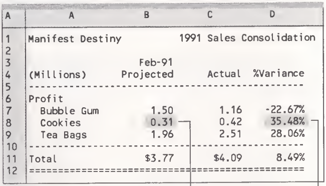
The updating of the file links occurred automatically because both the source and target files were in memory. However, if you change the source file when the target file is not in memory, *1-2-3* will not automatically update the file links. Instead, while the source file is in memory, use the File Open command to read the target file into memory. Or if the source file is no longer in memory, retrieve the target file and select /File Admin Link-Refresh. Doing so forces *1-2-3* to update the file links and present the new, changed values.



```
A          A              B             C            D          E
1   Cookie Division            1991 Sales and Expenses
2
3                         Feb-91
4   (Millions)         Projected     Actual  %Variance
5   --------------------------------------------------
6   Sales                   8.02       9.46     17.96%
7   Expenses                7.71       9.04     17.25%
8   --------------------------------------------------
9   Profit                 $0.31      $0.42     35.48%
10  ==================================================
```

FIGURE 3a

7.66+0.05



```
A          A              B             C            D
1   Manifest Destiny            1991 Sales Consolidation
2
3                         Feb-91
4   (Millions)         Projected      Actual  %Variance
5   ---------------------------------------------------
6   Profit
7     Bubble Gum            1.50        1.16    -22.67%
8     Cookies               0.31        0.42     35.48%
9     Tea Bags              1.96        2.51     28.06%
10  ---------------------------------------------------
11  Total                  $3.77       $4.09      8.49%
12  ===================================================
```

FIGURE 3b

+<<*COOKIE*>>*proj_feb*

+<<*COOKIE*>>*var_feb*

FIGURES 3a and 3b. Here we added 0.05 to the value contained in cell B7 of the Cookie Division file shown in Figure 3a. If the consolidation file is also in memory, the file links in cells B8 and D8 are automatically updated and the formulas in cells B11 and D11, which depend on those cells, are recalculated, as shown in figure 3b.

A FEW FINAL TIPS

Using multiple files in your application offers many new ways to work with *1-2-3*. However, you may also discover yourself making errors that you could not make before. This section outlines three potential problem areas and suggests how to avoid them.

Manage Multiple-Level Links

When you select /File Admin Link-Refresh to update the links in a target file, *1-2-3* does not first update links that may exist between source files and other files. That may sound somewhat confusing, so consider an example.

Suppose that cell A1 of file A contains a link to cell B1 of file B. Also suppose that cell A2 of file A links to cell B2 of file B, which links to cell C2 of file C. When you read file A into memory and select /File Admin Link-Refresh, *1-2-3* updates the link in cell A1 of file A, which refers to cell B1 of file B. *1-2-3* does *not* update the link in cell B2 of file B that links to cell C2 of file C. Therefore, the link in cell A2 of file A that depends on the link to file C will be incorrect if you have changed file C since the last time you updated the links in file B.

To avoid problems with multiple-level file linking, use one-level links or read all target files into memory before you modify a source file. Then *1-2-3* will automatically update all file links.

Use Range Names

When you use a range name in a file link, *1-2-3* uses the name to locate the source-file data. If you move the named source-file data, the range name continues to be assigned to the data. Therefore, the file link, which uses the range name, still refers to the correct data.

On the other hand, if you use cell addresses in a file link and then move the source-file data when the target file is not in memory, the target file will not know that you moved the data. Consequently, when you retrieve the target file, the file link will refer to the old location of the data, and formulas depending on that data will return incorrect results. That should be reason enough to convince you to use named ranges in file links.

Minimize Memory Use

To update a link to a formula in a source file, *1-2-3* must read into memory all the cells in the source file that the formula depends on. If your application has many file links to cells containing formulas, you may run low on memory. To update a link to a cell containing a value or label, *1-2-3* must read in only the cell to which the link has been made. Obviously, links to cells that contain values or labels instead of formulas require less memory to update.

If you run into memory problems when you try to update file links, determine whether the links are to formulas, values, or labels. If the links are to formulas that no longer need to be stored as formulas, convert the formulas to their calculated results.

To convert a range of cells, select /Range Value and specify the range containing the formulas as the From range and the To range. To convert a single cell, move the cell pointer to the cell, press the EDIT key followed by the CALC key, and then press Return. ■

David J. Bookbinder is a free-lance writer and author of The Lotus Guide to 1-2-3 Release 3 *(Addison-Wesley Publishing Co.).*

HOW TO SET UP THE CONSOLIDATION WORKSHEET

1. Releases

This model runs in *1-2-3* Release 3.

2. Default settings

Format: , 2

/Worksheet Global Format, type a comma, and press Return

Column width: 10

/Worksheet Global Col-Width, enter 10

3. Individual column width

Column	Width
A	16

Position the cell pointer in column A. Select /Worksheet Column Set-Width and enter 16.

4. Cell formats

Format	Range
Date 3	B3
Currency 2	B11..C11
Percent 2	D7..D11

For example, to set the format of cell B3, select /Range Format Date 3, and indicate cell B3.

5. Labels

Enter the labels shown in rows 1 and 4 and in column A of figure 2. Precede the entries in cells C1 and A4 with an apostrophe. Precede the labels in range A7..A9 with two character spaces. To right-align the labels in range B4..D4, select /Range Label Right and indicate range B4..D4. Enter \- in cell A5 and copy cell A5 to ranges B5..D5 and A10..D10. Enter \= in cell A12 and copy cell A12 to range B12..D12.

6. Enter and copy formulas

Cell	Formula
B3	@DATE(91,2,1)
B7	+<<GUM>>proj_feb
B8	+<<COOKIE>>proj_feb
B9	+<<TEA>>proj_feb
C7	+<<GUM>>act_feb
C8	+<<COOKIE>>act_feb
C9	+<<TEA>>act_feb
D7	+<<GUM>>var_feb
D8	+<<COOKIE>>var_feb
D9	+<<TEA>>var_feb
B11	@SUM(B6..B10)

Copy cell B11 to cell C11.

D11 (C11 – B11)/B11

ORDER ENTRY MADE SIMPLE

Streamline the mechanics of keyboarding information from printed order forms.

BY E. MICHAEL LUNSFORD

If you've ever tried to use *1-2-3* to enter sales orders into a table, you may have run into a few snags. For instance:

- Enter a street number, a zip code, or a phone number without a label prefix, and your computer beeps and stops in its tracks.
- Enter a purchase-order number without a label prefix, and the same thing happens.
- Enter a date in the familiar MM/DD/YY format, and the computer treats your entry as a division problem.

The macro-driven order-entry system for *1-2-3* Release 2.01 or higher that's presented here addresses just these kinds of problems. It keeps track of what column the cell pointer is in and processes entries accordingly. For example, it adds label prefixes to entries in columns where entries should be formatted as labels, and it accepts dates in the MM/DD/YY format.

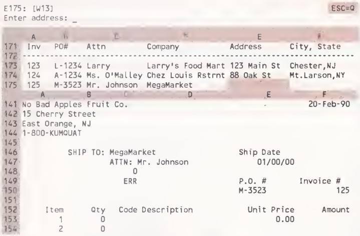
The model changes the prompt as you move the cell pointer left or right. Figure 1 shows how your computer screen looks as you use the model's macro for adding order-form data to the worksheet. The cell pointer is in cell E175 in the upper window, under the *Address* column. In the control panel, you see the prompt *Enter address*. If you type *33 Lane St.* and press Return, the macro enters the label *'33 Lane St.* in cell E175 and moves the cell pointer one cell to the right. The prompt then changes to *Enter city, state*.

The macro continues to move the cell pointer to the right, change the prompt, and accept your entries until you put an entry in the *Tax* column, shown in figure 2. Then the macro moves the cell pointer down and to the table's leftmost column.

The changing prompt is achieved by using a string-returning formula instead of a label for one of the model's macro instructions. We'll look later at how the macros work.

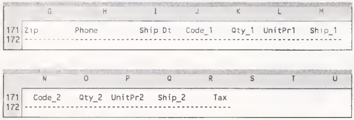
Figure 1 shows that the model employs *1-2-3*'s window feature. You can see part of the table of order-form data and most of the invoice you'll send to your customers at the same time. When you start to enter a new order, several cells in the *invoice* range return zeros or ERRs, but these cells are updated automatically as you enter data. Seeing the *invoice* range is helpful when you use the worksheet's billing macro to print out a bill by moving the cell pointer to its invoice number and pressing Return.

Create the model from the instructions in the box on page 46. Then read the next section to work



```
E175: [W13]                                                    ESC=Q
Enter address: _
       A      B        C                D                E           F
171  Inv   PO#     Attn          Company            Address      City, State
172 ---------------------------------------------------------------------------
173  123   L-1234 Larry          Larry's Food Mart 123 Main St  Chester,NJ
174  124   A-1234 Ms. O'Malley Chez Louis Rstrnt 88 Oak St     Mt.Larson,NY
175  125   M-3523 Mr. Johnson  MegaMarket
        A         B       C            D              E           F
141 No Bad Apples Fruit Co.                                    20-Feb-90
142 15 Cherry Street
143 East Orange, NJ
144 1-800-KUMQUAT
145
146            SHIP TO: MegaMarket                  Ship Date
147                     ATTN: Mr. Johnson              01/00/00
148                         0
149                        ERR                      P.O. #       Invoice #
150                                                 M-3523             125
151
152        Item       Qty   Code Description          Unit Price       Amount
153           1         0                                   0.00
154           2         0
```

FIGURE 1. This is how the order-entry worksheet looks while in use. Since the cell pointer is in the *Address* column, the control panel displays the prompt *Enter address*. The prompt changes to reflect the column in which the cell pointer is located. Another important feature: There is no need to type label prefixes.



```
          G           H           I        J        K        L        M
171 Zip         Phone         Ship Dt   Code_1    Qty_1  UnitPr1    Ship_1
172 ----------------------------------------------------------------------
```

```
        N         O        P         Q         R         S        T        U
171  Code_2    Qty_2  UnitPr2    Ship_2       Tax
172 ----------------------------------------------------
```

FIGURE 2. These screens show the headings for columns G through R of the order-form table.

ROB SAUNDERS

through an example. You'll see how this model would be used by a fruit vendor. Later you'll learn how to modify the model to suit your own business.

WORKING WITH THE ORDER-ENTRY SYSTEM

If you've entered the macros, lookup tables, invoice, and database areas properly and have established the range names correctly, you are now ready to enter your first order. Hold down the MACRO key (Alt on most computers) and press *A* (for *add*). The mode indicator at the upper-right corner of the screen changes to ESC=Q, meaning that the Escape key lets you quit the macro. The cell pointer is now at cell A173. Notice that the column headings appear twice. This only happens when the table has fewer than two records in it. To make the screen easier to read, press DownArrow twice and then press UpArrow twice.

The cell pointer is now in the first blank row below the column headings, and the prompt *Press F8 or enter invoice #* appears in the control panel. Pressing the F8 key produces an invoice number that is one greater than the previous number. You probably wouldn't use F8 when creating the first entry, so type a number, for example *123*, and press Return. You'll notice that when you type the first digit, it replaces the control-panel prompt. The additional digits appear after it on the control panel. After you press Return, the cell pointer moves to cell B173, and the number you entered now appears in cell A173.

Note that cell F150 in the lower window has changed from 0 to the number you just entered. The control-panel prompt now reads *Enter PO#*.

Try moving the cell pointer around before entering a purchase-order number. If you press LeftArrow, the cell pointer goes back to cell A173 and the prompt changes back to *Press F8 or enter invoice #*. If you made a mistake entering the invoice number, you could just enter a new one. Press RightArrow twice, and the cell pointer moves to cell C173, skipping over the column for purchase-order numbers. The prompt now reads *Enter attention line*. You can also move the cell pointer up or down. If you see a mistake in another row, just move the cell pointer there and correct it.

Move the cell pointer back to cell B173 for now. Enter any combination of characters. What you enter will become a label, even if it begins with a numeral, and it will be right-aligned in the cell. The cell pointer moves to the right and again the lower window is updated: Cell E150 now displays the purchase-order number you just entered.

The cell pointer is now in cell C173, and the prompt reads *Enter attention line*. Enter the name of the person who will receive the bill. The cell pointer moves to the right. You're prompted for a company name. Enter a name, and the cell pointer moves to the right again. Continue in this manner, entering the street address (remember, don't begin it with an apostrophe), the city and state, the zip code (5-digit or 9-digit), and the phone number. The lower window reflects each entry.

After you enter the phone number, the cell pointer jumps to the *Ship Dt* column, and the prompt reads *Press F8 or enter MM/DD [/YY]*. Press the F8 key, and today's date appears in cell I173 (assuming your computer's clock is set correctly). The cell is automatically assigned the long international date format, which probably means *MM/DD/YY*, or perhaps *DD/MM/YY*, *DD.MM.YY*, or *YY-MM-DD*. It depends on how your copy of *1-2-3* has been configured.

If you wish to enter a date manually, you must enter it in the same format you now see in cell I173. If necessary you can change the prompt for the *Ship Dt* column. You'll see how later.

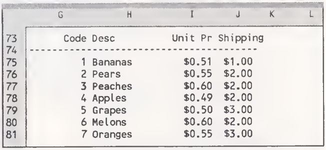
FOR USERS OF *1-2-3* RELEASES 2.2 AND 3

The two newest releases of *1-2-3*, 2.2 and 3, don't limit the message that a macro can display in the mode indicator to five characters. If you use one of these releases, you may wish to use a longer, more descriptive message with the {INDICATE} commands that appear in the *\a*, *suspend*, and *\b* macros.

For example, you could change the label in cell B5, shown in figure 4, to *{INDICATE "Press Esc to quit macro"}*. In place of the label in cell B48, shown in figure 6, you could use *{INDICATE "Add macro suspended—press F8 to return"}*. Finally, you could replace the label in cell B57, shown in figure 7, with *{INDICATE "Highlight invoice, press Return to print, Esc to quit"}*.

If you use *1-2-3* Release 3, the *adate* routine will work properly, but incorporating the entered characters into the @DATEVALUE functions turns out to be superfluous. This is because Release 3 automatically turns a cell entry, if it is in a valid date format, into a date value. If you wish, you can change the label in cell B33, shown in figure 6, to *{kpress}{?}~*.

The cell pointer should now be in column J, the *Code_1* column. The control panel now prompts you for a product code. (In its current form, this model lets you specify one or two items per invoice. You can add more items later.) Your choices for now are the numbers 1 through 7 because these are the values in the left column of the *prod* range shown in figure 3. If the customer wants bananas, use 1. If the customer wants pears, use 2. Later, you'll modify the *prod* range so that it uses your product numbers, descriptions, per-unit prices, and so forth. Enter a number, and the cell pointer moves to column K, the *Qty_1* column.



```
           G            H              I          J        K        L
73          Code Desc             Unit Pr Shipping
74   ---------------------------------------
75             1 Bananas            $0.51  $1.00
76             2 Pears              $0.55  $2.00
77             3 Peaches            $0.60  $2.00
78             4 Apples             $0.49  $2.00
79             5 Grapes             $0.50  $3.00
80             6 Melons             $0.60  $2.00
81             7 Oranges            $0.55  $3.00
```

FIGURE 3. This is the lookup table that formulas in the worksheet use to get the descriptions, prices, and shipping charges for the product codes the user enters.

The prompt now reads *Enter quantity*. For the fruit-supplier scenario, the numbers represent pounds of fruit. Enter *10*, for example, and the cell pointer moves to column L, the *UnitPr1* column.

The prompt now reads *Press F8 or enter unit price*. If you press the F8 key, the macro automatically enters the value from the *Unit Pr* column of the *prod* range that goes with the number you entered in the *Code* column. That is, if you've entered *1* in column J, pressing F8 gives you 0.51. If you've entered *2*, pressing F8 gives you 0.55, and so on. You can, alternatively, enter a different per-unit price.

Press F8 or enter a number, and the cell pointer moves to column M, the *Ship_1* column. Again, you have the choice of pressing F8 or entering a value. The former gives you the value from the *Shipping* column of the range *prod* that corresponds to the product code you entered.

Press F8 or enter a number, and the cell pointer moves to the *Code_2* column. This and the next three columns are essentially the same as the previous four columns. Proceed through them accordingly.

This brings the cell pointer to the *Tax* column. This column also allows you to press F8 to compute the tax automatically or to enter a value yourself. Press F8 to compute the tax automatically. When you do this, the cell pointer moves to the right, then down one row, and left all the way to column A. The model is ready for you to enter information from a second order form.

Press F8 to get the next invoice number (if you entered *123* earlier, the new number will be 124). Then enter a new purchase-order number. Suppose that the second order is from the same company as the first. Rather than entering all the information again, it would be easier to copy the entries in range C173..H173 (from the attention column through the phone-number column) into range C174..H174. Press the slash key and two things happen: The standard *1-2-3* menu appears, and the mode indicator changes to SUSP, which tells you that the add macro, *\a*, is temporarily suspended. To copy the information from the previous row, select Copy, press Backspace to release the cell pointer, then press UpArrow, type a period, highlight range C173..H173, and press Return twice. Now *1-2-3* functions as though it is in Ready mode, although the mode indicator still says SUSP.

Manually move the cell pointer to cell I174 and then press the F8 key. This returns you to the *\a* macro. Since the cell pointer is in the *Ship Dt* column, the prompt reads *Press F8 or enter MM/DD [/YY]*. The indicator again shows ESC = Q. Finish entering the second hypothetical order form, this time entering data for one item only. When you get to the *Code_2* column, you'll find that you can skip over fields by either pressing RightArrow or Return. Either one will move the cell pointer into the next column. Use F8 for the *Tax* column. Again, when the cell pointer goes past the rightmost column of the table, it moves down a row and returns to the leftmost column.

To quit the *\a* macro, press Escape.

THE BILLING MACRO

The billing macro lets you print invoices easily via a point-and-shoot scheme. It also lets you see, in the lower window, almost all the relevant data from a particular row at once. This is useful because in the upper window most of the information is off the screen.

Start the billing macro by pressing MACRO-B. The cell pointer moves to the first entry in the table of order-form data, the indicator changes to GOTO?, and the *invoice* range, shown in the lower window, reflects the information in the first row of the table. Press DownArrow, and the *invoice* range reflects the data from the second row. Press UpArrow, and the invoice range again reflects the data from the first row.

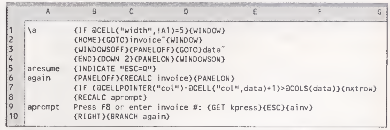
To print an invoice for any row, make sure your printer is turned on, position the cell pointer on the row, and press Return. To print another invoice, reposition the cell pointer and press Return again. When you're through printing invoices, press Escape.

HOW THE MODEL WORKS

Most of what you'll do with this model is controlled by the add macro, *\a*. The *\a* macro appears in figure 4. It starts by moving the cell pointer to the lower window. This is made possible by the fact that *1-2-3* allows different column widths in different windows. The instruction in cell B1 means that the macro presses the WINDOW key only if column A in the current window has a width of 5. (If you modify the worksheet, the two windows should use different widths for column A, and the number after the equal sign in cell B1 should be the width of the upper window's column A.)

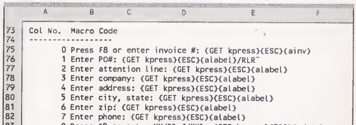
Cell B2 positions the invoice range within the lower window and then presses WINDOW to move the cell pointer to the upper window. Cells B3 and B4 position the cell pointer in the first empty cell in the leftmost column of the range *data*. Cell B5 changes the mode indicator. Cell B6 updates the *invoice* range.

The reason that the *\a* macro itself is so short is that most of its work is done by subroutines. When a word other than a key name or command name appears by itself in braces, it is an instruction to call a subroutine. That is, the macro runs the subroutine, but when that subroutine finishes (or executes the command {RETURN}) the macro returns to the instruction immediately following the subroutine call. Cell B7 contains *\a*'s first subroutine call, {nxtrow}, which is performed only if the cell pointer is beyond the rightmost column of the *data* range. If the condition defined in the {IF} command is



```
        A          B        C             D                   E                   F          G
1   \a         {IF @CELL("width",!A1)=5}{WINDOW}
2              {HOME}{GOTO}invoice~{WINDOW}
3              {WINDOWSOFF}{PANELOFF}{GOTO}data~
4              {END}{DOWN 2}{PANELON}{WINDOWSON}
5   aresume    {INDICATE "ESC=Q"}
6   again      {PANELOFF}{RECALC invoice}{PANELON}
7              {IF (@CELLPOINTER("col")-@CELL("col",data)+1)>@COLS(data)}{nxtrow}
8              {RECALC aprompt}
9   aprompt    Press F8 or enter invoice #: {GET kpress}{ESC}{ainv}
10             {RIGHT}{BRANCH again}
```

FIGURE 4. This macro controls the process of adding order-form data to the worksheet's table. The macro is short because most of the work is done by subroutines located in the next several rows. The entry in cell B9 is an @VLOOKUP formula that returns different lines of macro code, depending on the current location of the cell pointer.



```
          A         B        C           D              E              F
73   Col No.  Macro Code
74   -----------------
75         0 Press F8 or enter invoice #: {GET kpress}{ESC}{ainv}
76         1 Enter PO#: {GET kpress}{ESC}{alabel}/RLR~
77         2 Enter attention line: {GET kpress}{ESC}{alabel}
78         3 Enter company: {GET kpress}{ESC}{alabel}
79         4 Enter address: {GET kpress}{ESC}{alabel}
80         5 Enter city, state: {GET kpress}{ESC}{alabel}
81         6 Enter zip: {GET kpress}{ESC}{alabel}
82         7 Enter phone: {GET kpress}{ESC}{alabel}
83         8 Press F8 or enter MM/DD [/YY]: {GET kpress}{ESC}{adate}
84         9 Enter code: {GET kpress}{ESC}{avalue}
85        10 Enter quantity: {GET kpress}{ESC}{avalue}
86        11 Press F8 or enter unit price: {GET kpress}{ESC}{aprice}
87        12 Press F8 or enter shpg charge: {GET kpress}{ESC}{aship}
88        13 Enter code: {GET kpress}{ESC}{avalue}
89        14 Enter quantity: {GET kpress}{ESC}{avalue}
90        15 Press F8 or enter unit price: {GET kpress}{ESC}{aprice}
91        16 Press F8 or enter shpg charge: {GET kpress}{ESC}{aship}
92        17 Press F8 or enter tax: {GET kpress}{ESC}{atax}
```

FIGURE 5. The macro-code labels used by the lookup formula in the *\a* macro. When the cell pointer is in the first column (column 0) of the *data* range, cell B9 repeats the label shown in cell B75. Whenever the cell pointer is in that column and the macro executes the instruction in cell B9, the *\a* macro types the characters *Press F8 or enter invoice #* in the control panel, waits for the user to press a key, clears the control panel, and calls the *ainv* subroutine. If the cell pointer is in the second column (column 1) when the macro processes cell B9, the *\a* macro types the characters and invokes the commands shown in cell B76, and so on.

true, \a passes control to the *nxtrow* routine, which moves the cell pointer down, moves it left the number of columns in *data*, and recalculates the range *invoice*. When *nxtrow* is finished, the \a macro takes over again, starting from the instruction {RECALC aprompt} in cell B8, immediately after the subroutine call.

The range *aprompt* is located in cell B9, which contains an @VLOOKUP formula. Depending on which column the cell pointer is in, this formula returns one of the labels in range B75..B92, shown in figure 5. Each of these labels is a line of macro code. They begin with characters that appear in the control panel as prompts, followed by the command {GET kpress}, the keyword {ESC}, and the name of a subroutine. Cell B9 does four things: It types a label in the control panel (but does not press Return); it waits for the user to press a key and stores the keystroke in the cell named *kpress*; it presses Escape to get rid of the prompt label; and then it calls a subroutine.

Which subroutine is called depends on the column. In some cases, the subroutine is specific to one column only. Cell B75, for example, ends with {ainv}. This subroutine is used only for the invoice column. The other column-specific subroutines called by the macro instructions in figure 5 are *aprice*, *aship*, and *atax*. Each of these subroutines begins with the letter A, to more readily identify each of them with \a, the macro that calls them.

Several of the labels in range B75..B92 end with {alabel}, which is a general-purpose subroutine that types an apostrophe so that whatever the user enters is treated as a label. A few end with {avalue}, which accepts entries for columns that contain values. Cell B83 ends with {adate} which accepts entries and, if possible, converts them to date values. Note that cell B76 alone contains one additional command after its subroutine call, /RLR~, which right-aligns the label in the current cell.

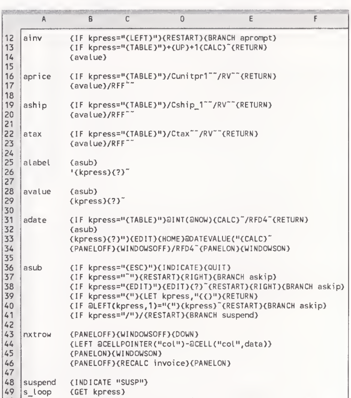
The subroutines themselves are shown in figure 6. *Ainv*, beginning in cell B12, starts with an instruction that keeps you from moving the cell pointer to the left of the *Inv* column. This would matter more if the *data* range started in a column other than column A. As it is, this instruction keeps your computer from beeping if you press the LeftArrow key from the *Inv* column.

Ainv and the other column-specific subroutines check to see if the key you pressed was F8 (which would fill the cell *kpress* with the label *{TABLE}*). When this is the case, these routines enter a formula in, or copy a formula to, the current cell and convert the formula to a value. If the key you pressed wasn't F8, the operative routine calls the *avalue* routine. When *avalue* is finished, it passes control back to the routine that called it. Because {avalue} is the last instruction in *ainv*, control passes back to \a.

The function of the *alabel* and *avalue* routines (ranges B25..B26 and B28..B29) is to type the first character you pressed in response to the prompt, then pause to let you type additional characters and press Return.

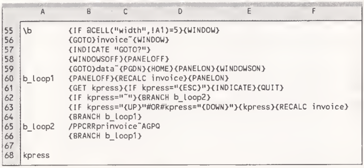
Both *alabel* and *avalue* start by calling the *asub* routine, which starts in cell B36. *Asub* handles certain "exception" keystrokes:

- If you pressed Escape, *asub* resets the mode indicator and terminates the macro.
- If you pressed Return, *asub* cancels all subroutine calls with the {RESTART} command, moves the pointer to the right, and branches to the cell named *askip* in the \a macro.
- If you pressed EDIT, *asub* invokes the Edit mode, allowing you to make changes to the current cell.
- If you typed { (a left brace), *asub* changes the contents of *kpress* from { to {{} (a left brace in braces), and passes control back to the routine that called it. This is necessary to prevent an error in the macro syntax.
- If you pressed a pointer-movement key or a function key (other than F2 or F8), *asub* simply processes your keystroke by calling *kpress* as a subroutine and then branches to *askip*.
- Finally, if you typed / (a slash), cell B41 brings up



```
      A          B         C              0                    E               F
12  ainv      {IF kpress="{LEFT}"}{RESTART}{BRANCH aprompt}
13            {IF kpress="{TABLE}"}+{UP}+1{CALC}~{RETURN}
14            {avalue}
15
16  aprice    {IF kpress="{TABLE}"}/Cunitpr1~~/RV~~{RETURN}
17            {avalue}/RFF~~
18
19  aship     {IF kpress="{TABLE}"}/Cship_1~~/RV~~{RETURN}
20            {avalue}/RFF~~
21
22  atax      {IF kpress="{TABLE}"}/Ctax~~/RV~~{RETURN}
23            {avalue}/RFF~~
24
25  alabel    {asub}
26            '{kpress}{?}~
27
28  avalue    {asub}
29            {kpress}{?}~
30
31  adate     {IF kpress="{TABLE}"}@INT(@NOW){CALC}~/RFD4~{RETURN}
32            {asub}
33            {kpress}{?}"){EDIT}{HOME}@DATEVALUE("{CALC}~
34            {PANELOFF}{WINDOWSOFF}/RFD4~{PANELON}{WINDOWSON}
35
36  asub      {IF kpress="{ESC}"}{INDICATE}{QUIT}
37            {IF kpress="~"}{RESTART}{RIGHT}{BRANCH askip}
38            {IF kpress="{EDIT}"}{EDIT}{?}~{RESTART}{RIGHT}{BRANCH askip}
39            {IF kpress="{"}{LET kpress,"{{}"}{RETURN}
40            {IF @LEFT(kpress,1)="{"}{kpress}~{RESTART}{BRANCH askip}
41            {IF kpress="/"}/{RESTART}{BRANCH suspend}
42
43  nxtrow    {PANELOFF}{WINDOWSOFF}{DOWN}
44            {LEFT @CELLPOINTER("col")-@CELL("col",data)}
45            {PANELON}{WINDOWSON}
46            {PANELOFF}{RECALC invoice}{PANELON}
47
48  suspend   {INDICATE "SUSP"}
49  s_loop    {GET kpress}
50            {IF kpress="{TABLE}"}{ESC 6}{INDICATE}{BRANCH aresume}
51            {IF kpress="{"}{LET kpress,"{{}"}
52            {kpress}
53            {BRANCH s_loop}
```

FIGURE 6. These are the subroutines called by the \a macro. Some of them enter a value automatically when the user presses F8. Others make it easier to enter labels, values, or dates. The *asub* routine checks to see if the first keystroke matches certain exceptions. The *nxtrow* routine moves the pointer down to a new row and to the leftmost column of the range *data*. The *suspend* macro takes over from the \a macro and lets the user perform miscellaneous tasks like copying entries. It returns control to the \a macro when the user presses F8.



```
        A         B       C           D                E             F
55  \b          {IF @CELL("width",!A1)=5}{WINDOW}
56              {GOTO}invoice~{WINDOW}
57              {INDICATE "GOTO?"}
58              {WINDOWSOFF}{PANELOFF}
59              {GOTO}data~{PGDN}{HOME}{PANELON}{WINDOWSON}
60  b_loop1     {PANELOFF}{RECALC invoice}{PANELON}
61              {GET kpress}{IF kpress="{ESC}"}{INDICATE}{QUIT}
62              {IF kpress="~"}{BRANCH b_loop2}
63              {IF kpress="{UP}"#OR#kpress="{DOWN}"}{kpress}{RECALC invoice}
64              {BRANCH b_loop1}
65  b_loop2     /PPCRRprinvoice~AGPQ
66              {BRANCH b_loop1}
67
68  kpress
```

FIGURE 7. The billing macro lets you print an invoice to send to a customer when you highlight the invoice number in the upper window and press Return. The range named *kpress* also appears in this figure. Both the \*a* and \b macros use this cell to store the first character typed in response to a prompt.

1-2-3's main menu, cancels subroutines called previously, and branches to the *suspend* macro. We'll look at *suspend* in detail in a moment.

If you did not press an exception key, control passes back to whichever routine called *asub*. *Alabel* types an apostrophe, calls *kpress* as a subroutine (meaning that the character you typed becomes the first character of your entry), and then allows you to type additional characters and end with the Return key. It then passes control back to \a. *Avalue* does the same, except that it doesn't type the apostrophe.

Adate checks to see if you pressed F8. If so, *adate* types the formula @INT(@NOW), turns the formula into a value, and passes control back to \a. If the key wasn't F8, *adate* calls *asub* to check for exception keystrokes. Assuming the key isn't one of the exceptions, *adate* types it and pauses for you to type additional characters and then press Return. It then incorporates the characters into an @DATEVALUE function, converts the function to a value, presses Return, assigns the Date 4 format to the current cell, and passes control back to \a. If @DATEVALUE can't convert the character string into a date, the *adate* routine leaves *ERR* in the cell.

The *nxtrow* routine was discussed in the explanation of the \a macro.

The *suspend* macro does what its name implies: It temporarily suspends operation of the \a macro. As we saw earlier, *suspend* starts when you press the slash key while using the \a macro. It begins by changing the mode indicator to SUSP, then waits for you to press a key, and stores that keystroke in *kpress*. Next, it checks to see if you pressed F8, in which case it erases *kpress* and branches to the *aresume* cell in the \a macro. If the key wasn't F8, *suspend* checks to see if the key was a left brace, in which case it changes *kpress* from { to {{} to prevent syntax errors. Then it types the keystroke stored in *kpress* and branches back to *s_loop*, so that *suspend* waits for you to press another key.

In other words, when *suspend* is operating, *1-2-3* functions normally. It's as though no macro were operating—except that the mode indicator doesn't change, you can't start macros, and you can't use the F8 key to rebuild a data table that you have previously defined.

The \b (billing) macro appears in figure 7. It starts by setting up the screen in the same way the \a macro does. Again, the number after the equal sign in cell B55 should always match the width of the upper window's column A. The macro changes the mode indicator to GOTO?, positions the cell pointer on the first invoice number, and updates the *invoice* range. It waits for you to press a key, which it stores in the cell *kpress*. If you press the Escape key, the indicator is reset and the macro ends. If you press Return, the macro branches to *b_loop2*. If you press the UpArrow or DownArrow keys, the macro moves the cell pointer up or down. Next, the macro branches to *b_loop1* to update the *invoice* range and waits for a key to be pressed. If the key you press wasn't Escape, Return, UpArrow, or DownArrow, the macro branches back to *b_loop1* without moving the cell pointer. If the macro has branched to *b_loop2*, it prints the *invoice* range and branches back to *b_loop1*.

MODIFYING THE ORDER ENTRY MODEL

Since the purpose of your business is probably not to sell bananas, pears, oranges, and so forth, you will need to modify the table of codes, descriptions, unit prices, and shipping costs shown in figure 3.

If the macro is running (the mode indicator reads ESC=Q), press the Escape key to quit the macro. Press the WINDOW key, if necessary, to move the cell pointer to the lower window, then press the GOTO key, and enter *prod*. Starting in cell G75, enter your own information in place of the fruit-supplier information. Format any new prices for currency with two decimal places. The *prod* range is used as an argument in @VLOOKUP formulas. If you use values in the code column, you must arrange the entries in ascending order by codes. If you use labels in the code, you can arrange the entries in any order, but you must then change the lines of macro code in the range *prompts* that begin with *Enter code*. They should end with {alabel} instead of {avalue}.

When you've added your information, you must expand the *prod* range so that it includes all your entries: Select /Range Name Create, enter *prod*, and then press the DownArrow key until all additional entries are highlighted. There is room for about 75 entries without moving other ranges or adding rows to the worksheet.

Next you'll need to change labels in the *invoice* range. Press GOTO and enter *invoice*. Start by replacing the labels in range A141..A144 with the name, address, and phone number of your own company. Add other labels as you like. For example, you may wish to add a label that specifies your company's billing terms. Use the Move command to reposition formulas and labels within *invoice*. If you want to add other formulas that return information from the *data* range, they should be in this form:

@INDEX(data,@HLOOKUP("*colname*",data,0),
@CELLPOINTER("row")−@CELL("row",data))

Replace *colname* with the label in row 171 of the column from which you want the value. This word must be spelled exactly as it appears in row 171, including capitalization, and must be in quotation marks.

You can also change the table of order entries. The simplest change would be to replace one column heading with another. Suppose you want to use the third column for customer status (preferred, regular, nonprofit, and so forth) instead of a contact person. First change the entry in cell C171 to read *Status*. Now you must also change the prompt that appears when the cell pointer is in the third column. Change the label in cell B77 to:

```
Enter status: {GET kpress}{ESC}{alabel}
```

If you make this change, the formula in cell C147 in the *invoice* range will only return ERR since one of its arguments is the character string *Attn*. Change this formula to:

```
+"STATUS: "&@INDEX(data,@HLOOKUP
  ("Status",data,0),@CELLPOINTER("row")
   -@CELL("row",data))
```

You may wish to add columns to the table. Suppose you'd like to have an order date as well as a ship date. First press GOTO and enter *I169*. You'll use the Move command rather than the Insert Columns command to avoid corrupting other ranges in the worksheet. Assuming you've entered only two lines of data so far, move range I169..R174 to cell J169. Include rows 169 and 170 because you've entered formulas above some of the columns. Next, select /Range Name Create, enter *data*, and make sure that the range extends from column A to column S.

Now enter *"Ordr Dt* in cell I171 and enter \- in cell I172. Then press GOTO and enter *prompts*. Move range B83..B92 to cell B84 and then copy cell B84 to cell B83. Enter *18* in cell A93. Select /Range Name Create, enter *prompts*, and make sure that the range includes range A75..B93. Note that because you've added a column to the table, you've also added a row to the range *prompts*. The number of columns in the range *data* must always equal the number of rows in the range *prompts*.

Finally, here's the procedure for adding columns to

HOW TO SET UP THE ORDER-ENTRY WORKSHEET

1. Releases

This model works in *1-2-3* Releases 2.01, 2.2, and 3.

2. Default settings

Recalculation: Manual

Select /Worksheet Global Recalculation Manual.

3. Individual column widths

A	10
C	7
D	21
E	13
F	12

For example, to set the width of column A, position the pointer in column A, select /Worksheet Column Set-Width, and enter *10*.

4. Cell formats

Format	Range
Fixed 2	E153, F156..F157, L170..M170, R170
Currency 2	I75..J81, F153, F155, F159, S170
Date 1	F141
Date 4	E147

For example, to assign the format to cell E153, select /Range Format Fixed, press Return to accept the default of two decimal places, and specify cell E153.

5. Labels

Enter the labels shown in row 171 of figures 1 and 2. Don't be concerned that the column widths on your screen don't match those in the figure. We'll change these later. Right-align the labels in range I171..R171: Select /Range Label Right, specify range I171..R171. Enter \- (a backslash and a hyphen) in cell A172 and copy cell A172 to range B172..R172.

Enter the labels in ranges A141..A144, E149..F149, and A152..F152 and cells B146 and E146 of figure 1. Enter *Shipping* in cell G152, *SHPG/HNDLNG* in cell E156, *TAX* in cell E157, and *TOTAL* in cell E159. Right-align the labels in ranges A152..C152, E152..F152, and E156..E159.

Enter the labels in ranges G73..J73 and H75..H81 of figure 3. Right-align cells G73 and I73. Enter \- in cell G74 and copy cell G74 to range H74..J74.

Enter the labels shown in figure 4. Do not enter anything in cell B9.

Enter the labels shown in figure 6. Note that you begin the label in cell B26 with two apostrophes: *''{kpress}{?}*.

Enter the labels shown in figure 7. Remember to type an apostrophe when entering the label in cell B65.

Enter the labels in ranges A73..B73 and B75..B92 in figure 5. Enter \- in cells A74 and B74.

6. Values

Enter the values *0* through *17* in range A75..A92: Select /Data Fill, specify range A75..A92, and press Return three times to accept the default start, step, and stop values. Enter *1* and *2* in cells A153 and A154. Enter *.06* (or your state's sales tax rate) in cell R169. Enter the values shown in range G75..G81 and range I75..J81 of figure 3.

7. Range names

Use the values in range A1..A68 to assign names to individual cells in column B: Select /Range Name Labels Right and specify range A1..A68. Then use the labels in range J171..R171 to assign names to cells in row 170: Select /Range Name Labels Up and specify range J171..R171. Then assign the following additional range names:

Name	Range
data	A171..R270
invoice	A141..G159
prinvoice	A141..F159
prod	G75..J81
prompts	A75..B92
taxrate	R169

For example, to assign the name to range A171..R270, select /Range Name Create, enter *data*, and specify range A171..R270.

accommodate an additional item on an order form. If you added an *Order Dt* column as described in the last paragraph, the table's *Tax* column is now in column S. Press GOTO and enter *S169*. Move range S169..S174 to cell W169. Enter the labels *Code_3*, *Qty_3*, *UnitPr3*, and *Ship_3* in range S171..V171. Use the Range Label Right command to right-align these labels. Select /Range Name Labels Up and specify range S171..V171. Copy cell R172 to range S172..V172. Use the Range Name Create command to adjust the *data* range so that it extends to column W.

Press GOTO and enter *prompts*. Move cell B93 to cell B97. Enter the values *19* through *22* in range A95..A97. Copy range B89..B92 to range B93. Make sure the *prompts* range extends to row 97. Modify the formula that is now in cell W170 to read:

```
(qty_1*unitpr1 + qty_2*unitpr2 + qty_3*
  unitpr3)*$taxrate
```

To complete this process, press GOTO and enter *invoice*. Enter a *3* in cell A155, then enter the following additional formulas:

B155	@INDEX(data,@HLOOKUP("Qty_3",data,0), @CELLPOINTER("row") - @CELL("row",data))
C155	@IF(B155>0,@INDEX(data,@HLOOKUP ("Code_3",data,0), @CELLPOINTER("row") - @CELL("row",data)),"")
D155	@IF(B155>0,@VLOOKUP(C155,$prod,1),"")
E155	@IF(B155>0,@INDEX(data,@HLOOKUP ("UnitPr2",data,0), @CELLPOINTER ("row") - @CELL("row",data)),"")
F155	@IF(B155>0,E155*B155,"")
G155	@INDEX(data,@HLOOKUP("Ship_3",data,0), @CELLPOINTER("row") - @CELL("row",data))

Change the formula in cell F156 to read +G153+G154+G155.

When you make changes like this, keep in mind that every column in the order-form table must have a unique column heading. ■

E. Michael Lunsford is the developer of 101 Macros Plus for 1-2-3 *(Individual Software Inc.) and author of* The 1-2-3 Upgrade Guide *(1989, Bantam Electronic Publishing).*

8. Formulas

Note that many of the formulas initially return ERR.

Cell	Formula
B9	@VLDDKUP(@CELLPOINTER("col") - @CELL("col",data),A75..B92,1)
F141	@NOW
C146	@INDEX(data,@HLOOKUP("Company",data,0),@CELLPOINTER ("row") - @CELL("row",data))
C147	+"ATTN: "&@INDEX(data, @HLOOKUP("Attn",data,0), @CELLPOINTER("row") - @CELL ("row",data))
E147	@INDEX(data,@HLOOKUP("Ship Dt",data,0),@CELLPOINTER ("row") - @CELL("row",data))
C148	@INDEX(data,@HLOOKUP("Address",data,0),@CELLPOINTER ("row") - @CELL("row",data))
C149	@INDEX(data,@HLOOKUP ("City,State",data,0), @CELLPOINTER("row") - @CELL("row",data))&" "& @INDEX(data,@HLOOKUP ("Zip",data,0) ,@CELLPDINTER("row") - @CELL("row",data))
E150	@INDEX(data,@HLOOKUP ("PO#",data,0), @CELLPOINTER("row") - @CELL("row",data))
F150	@INDEX(data,@HLDDKUP("Inv",data,0), @CELLPDINTER("row") - @CELL("row",data))
B153	@INDEX(data,@HLOOKUP("Qty_1",data, 0), @CELLPOINTER("row") - @CELL("row",data))
C153	@IF(B153>0,@INDEX (data,@HLOOKUP ("Code_1",data,0), @CELLPOINTER("row") - @CELL("row",data)),"")
D153	@IF(B153>0,@VLDDKUP (C153,$prod,1),"")

Copy cell D153 to cell D154.

E153	@IF(B153>0,@INDEX (data,@HLOOKUP ("UnitPr1",data,0),@CELLPOINTER ("row") - @CELL("row",data)),0)
F153	@IF(B153>0,E153*B153,"")

Copy cell F153 to cell F154.

G153	@INDEX(data,@HLDDKUP ("Ship_1",data,0), @CELLPOINTER("row") - @CELL("row",data))
B154	@INDEX(data,@HLOOKUP ("Qty_2",data,0), @CELLPDINTER("row") - @CELL("row",data))
C154	@IF(B154>0,@INDEX (data,@HLOOKUP ("Code_2",data,0), @CELLPDINTER("row") - @CELL("row",data)),"")
E154	@IF(B154>0,@INDEX (data,@HLDDKUP ("UnitPr2",data,0), @CELLPOINTER("row") - @CELL("row",data)),"")
G154	@INDEX(data,@HLOOKUP ("Ship_2",data,0), @CELLPOINTER("row") - @CELL("row",data))
F156	+G153+G154
F157	@INDEX(data,@HLOOKUP ("Tax",data,0), @CELLPOINTER("row") - @CELL("row",data))
F159	@SUM(F153..F157)
L170	@VLOOKUP(code_1,$prod,2)
M170	@VLOOKUP(code_1,$prod,3)
R170	(qty_1*unitpr1 + qty_2*unitpr2)*$taxrate

9. Windows and titles

Press Home, then move the cell pointer to cell A6. Select /Worksheet Window Horizontal and then /Worksheet Window Unsync. The cell pointer should be in the upper window. If it is not, press the WINDOW key (F6 on most computers). Press GOTO and enter *data*. Move the cell pointer down to cell A173 and select /Worksheet Titles Horizontal.

10. Upper-window column widths

Column	Width
A	5
C	13
D	18
E	13
F	14
G	11
H	13

For example, to set the width of column A, make sure that the cell pointer is in column A of the upper window. Then select /Worksheet Column Set-Width and enter *5*.

TESTING CHOICES IN A HURRY

A data table lets you see the impact of many different values in a formula.

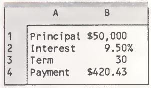
BY LARRY ROSHFELD

Sometimes you're lucky enough to have a problem that you can solve by using one simple formula. For example, you might know the principal, interest rate, and term of a loan and need to find what the monthly payment will be. You call on the @PMT function, and that's that. At other times, you might need to ask more questions.

You may wonder what combination of interest and term will give you the lowest monthly payments. Or given that you want a 30-year loan, you may want to compare the financing packages offered by 4, or even 40, banks. A simple formula won't provide answers to these queries. To generate a satisfactory solution to that kind of what-if question, you'll need a *1-2-3* data table or a *Symphony* what-if table. Note that throughout this article, we'll use the term data-table to refer to the tables available in *1-2-3* and *Symphony*.

Let's use an example to demonstrate the power of data tables. Suppose you plan to borrow money from a bank in order to purchase a home. You know that you can afford a maximum monthly payment of $500. What you don't know is what principal amount at what interest rate will keep your payments under that maximum.

Assume that you're interested in a simple fixed-rate loan with interest calculated on a monthly basis. A local bank offers you a loan for $50,000 at 9.50% interest and will give you 30 years to repay. Will the monthly payment be within your reach?



	A	B
1	Principal	$50,000
2	Interest	9.50%
3	Term	30
4	Payment	$420.43

FIGURE 1. A simple loan-analysis model works well when evaluating only one scenario.

To answer that question, you will need to enter the data in a blank spreadsheet. Enter the labels shown in column A of figure 1. Enter the values shown in range B1..B3. Move the pointer to cell B1 and format the cell for currency with no decimal places. Select /Range Format Currency (in *Symphony*, MENU Format Currency), enter 0, and press Return. Use the same process to format cell B2 for percent with two decimal places and cell B4 for currency with two decimal places.

With this data in the spreadsheet, you're ready to enter the @PMT formula that calculates the monthly payment. Enter the formula @PMT(B1,B2/12,B3*12) in cell B4.

The first argument of the formula refers to cell B1, which contains the principal. Because you'll make monthly loan payments, you need to calculate the monthly interest. Therefore, the second argument of the formula is the annual interest rate (cell B2) divided by 12. The third argument in the formula represents the term. Because the loan is for 30 years and you'll make monthly payments, the term (cell B3) is multiplied by 12.

The result of the formula, $420.43, is the payment you would make each month over the next 30 years to repay a $50,000 loan at an interest rate of 9.50%.

The @PMT function allows you to determine the monthly payment given a specific set of variables. A for-

---

Larry Roshfeld is a senior systems engineer with Lotus Development Corp. and a frequent contributor to LOTUS.

mula is handy when you need to calculate a single solution. But in this case, you know that you can afford a monthly payment of up to $500. You're faced with the question, How can I calculate the principal amount that will give me a monthly payment that is closest to $500?

Consider three approaches to this type of problem. The first option is to use trial and error. With this method, you enter various principal amounts in cell B1 and try to find one that results in a monthly payment of approximately $500. This process eventually produces an answer to your question. However, the method is flawed in two ways. First, it relies on repetitive data entry. Second, it doesn't allow you to refer to the results of previous calculations because each time you test a new principal, you destroy the results of the prior calculation.

A second option is to create a series of @PMT formulas, each using a different principal amount. Then you can look at the results of the formulas to determine which comes closest to $500. The problem with this approach is that it requires a great deal of time to create the model. For example, suppose you want to calculate the monthly payment for loans in the amounts of $50,000 through $60,000, in $1,000 increments. You'd need 11 @PMT formulas, one for each principal amount.

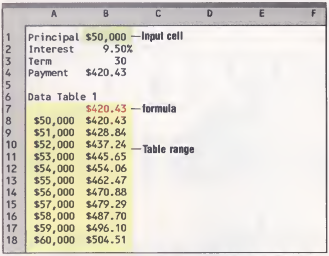
While both of these approaches provide the right answer, neither is efficient nor elegant. Instead, let's evaluate a third approach. This one takes advantage of a feature that is built into *1-2-3* and *Symphony*: the Data Table (in *Symphony*, Range What-If) commands.

MOVE TO THE TABLE

Using the Data Table commands, you can create a model that plugs a series of values into a formula. In this case, you build Data Table 1, which inserts a series of different principal amounts into an @PMT formula.

Enter the label shown in cell A6 of figure 2. Then enter

JOHN HERSEY



	A	B	C	D	E	F
1	Principal	$50,000				
2	Interest	9.50%				
3	Term	30				
4	Payment	$420.43				
5						
6	Data Table 1					
7		$420.43				
8	$50,000	$420.43				
9	$51,000	$428.84				
10	$52,000	$437.24				
11	$53,000	$445.65				
12	$54,000	$454.06				
13	$55,000	$462.47				
14	$56,000	$470.88				
15	$57,000	$479.29				
16	$58,000	$487.70				
17	$59,000	$496.10				
18	$60,000	$504.51				

—Input cell
—formula
—Table range

FIGURE 2. Data Table 1 calculates the monthly payment on a loan with differing principals. One by one, each principal amount in range A8..A18 is substituted into the input cell, and the worksheet recalculates to determine the monthly loan payment, which is recorded in range B8..B18. For example, a 30-year loan of $58,000 at 9.50% interest requires a monthly payment of $487.70.

the formula @PMT(B1,B2/12,B3*12) in cell B7.

Now assign cell formats. Select /Range Format Currency (in *Symphony*, MENU Format Currency), enter 0, and specify range A8..A18. Format range B7..B18 for currency with two decimal places. Next enter the series of principal amounts that you want to use in the @PMT formula. To simplify this process, use the Data Fill (in *Symphony*, Range Fill) command, which allows you to enter a series of consecutive values in a designated range.

Select /Data Fill (in *Symphony*, MENU Range Fill). Specify range A8..A18 as the Fill range, 50000 as the start value, 1000 as the step value, and 60000 as the stop value. Range A8..A18 fills with values between $50,000 and $60,000, in increments of $1,000.

Now you're ready to use the Data Table (in *Symphony*, Range What-If) command, which requires you to specify a Table range and an input cell. The Table range includes the column containing the values that are to be substituted into the formula—in this case, the various principal amounts—as well as an adjacent column, which holds the results of the series of @PMT formulas. Here the Table range is A7..B18.

The input cell is a cell that is located outside the Table range and into which *1-2-3* or *Symphony* plugs the values, one by one. When a value is substituted into this cell, the entire worksheet is recalculated. The result of the formula then appears adjacent to the value that was used in that recalculation of the worksheet. In this case, the input cell is cell B1.

Now select /Data Table 1 (in *Symphony*, MENU Range What-If 1-Way). Specify the Table range as range A7..B18 and the input cell as cell B1. *1-2-3* or *Symphony* recalculates the worksheet once for each value and places the results in range B8..B18, as shown in figure 2.

Let's run through the recalculation process. The first value in the first column of the table—in this example, $50,000—is copied to cell B1. Then the worksheet recalculates, and $420.43, the result of the @PMT formula in cell B7, appears in cell B8. Then the second value, $51,000, is copied to cell B1, the worksheet is recalculated, and $428.84, the result of the formula in cell B7, appears in cell B9. This process is repeated until each value listed in the first column of the table has been substituted into the input cell.

Given the results produced by the data table, you can afford a $59,000 loan because the monthly payment would be $496.10, just under the $500 limit.

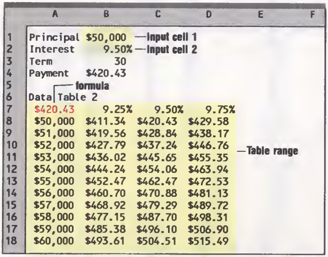
A TABLE WITH TWO VARIABLES

So far you've assumed that the interest rate and term are constant and that only the principal amount might vary. However, when you're shopping for a 30-year mortgage, you'll probably find that the interest rate, as well as the principal, will vary. If that's the case, you need a table that substitutes pairs of values into each @PMT formula. Data Table 2 does the job.

Figure 3 shows the table you would create. It's very similar to Data Table 1, which you just created, except that in addition to the column of principal amounts, this table contains a row of interest rates. Let's build the table and then discuss the details of using it.

Edit the label in cell A6 to match figure 3. Select /Range Erase (in *Symphony*, MENU Erase) and erase range B7..B18. Format cell A7 and range C8..D18 for currency with two decimal places. Format range B7..D7 for percent with two decimal places. Enter the formula @PMT(B1, B2/12,B3*12) in cell A7.

This formula should look familiar to you. It's the same



	A	B	C	D	E	F
1	Principal	$50,000				
2	Interest	9.50%				
3	Term	30				
4	Payment	$420.43				
5						
6	Data Table 2					
7	$420.43	9.25%	9.50%	9.75%		
8	$50,000	$411.34	$420.43	$429.58		
9	$51,000	$419.56	$428.84	$438.17		
10	$52,000	$427.79	$437.24	$446.76		
11	$53,000	$436.02	$445.65	$455.35		
12	$54,000	$444.24	$454.06	$463.94		
13	$55,000	$452.47	$462.47	$472.53		
14	$56,000	$460.70	$470.88	$481.13		
15	$57,000	$468.92	$479.29	$489.72		
16	$58,000	$477.15	$487.70	$498.31		
17	$59,000	$485.38	$496.10	$506.90		
18	$60,000	$493.61	$504.51	$515.49		

FIGURE 3. Data Table 2 calculates the monthly payment on a loan with differing principals and interest rates. Pairs of principal amounts and interest rates are substituted into the input cells, and the worksheet recalculates to determine the monthly loan payment. For example, you'll make a monthly payment of $463.94 on a 30-year loan of $54,000 at 9.75% interest.

one you used to calculate the single monthly payment in the one-way data table of payments. Enter the interest rates shown in range B7..D7. Be sure to enter the percent sign after each value.

Next select /Data Table 2 (in *Symphony*, MENU Range What-If 2-Way). Specify range A7..D18 as the Table range. Again, notice that the Table range includes the formula, as well as all the values.

Now you need to specify the input cells. The values in the leftmost column of the table will be substituted into Input cell 1. In this case, these are principal amounts. Because the formula in cell A7 refers to cell B1 for the principal amount, and this is where you want *1-2-3* or *Symphony* to plug in the principal values, cell B1 is Input cell 1. The values listed across the top of the table will be substituted into Input cell 2. In this case, these are interest rates. The formula in cell A7 refers to cell B2 for the interest rate, so cell B2 is Input cell 2. Specify cell B1 as Input cell 1 and cell B2 as Input cell 2.

The calculated results appear in range B8..D18 of the table, as shown in figure 3. To calculate the results, each principal amount is paired with an interest rate and these values are placed into cells B1 and B2, respectively. The worksheet recalculates, and the result appears in the appropriate position in the table. For example, a $53,000 loan at 9.50% interest requires a $445.65 monthly payment.

A FEW FINAL WORDS

As you've seen, data tables provide a simple way to stretch the power of formulas. However, there are a few points to remember.

First, certain parts of the table must be in specific locations. In Data Table 1, the first cell of the first column of the table remains blank. The formula for Data Table 1 must be in the first cell in the second column of the table. If you're using two or more formulas in Data Table 1, enter them in adjacent cells in the first row of the table and be sure that all the formulas contain a reference to the same input cell. In Data Table 2, the formula always resides in the first cell of the first column. Then be sure to specify a Table range that includes all of the columns and rows containing data.

The location of the values is also important. The first column always contains the values that will be substituted into the input cell in Data Table 1 or into Input cell 1 in Data Table 2. The top row of Data Table 2 always contains the set of values that will be substituted into Input cell 2. You enter this second set of values, starting in the cell just to the right of the formula. Finally, in both Data Table 1 and in Data Table 2, the input cell or cells must be outside the Table range.

Second, the results displayed in a data table are values, not formulas. Therefore, if you change the values that are substituted into the formula, you must instruct *1-2-3* and *Symphony* to rebuild the table. For example, suppose you decide to test the interest rates 10.25%, 10.50%, and 10.75%. You enter these values in range B7..D7. If you're using *1-2-3*, you can just press the TABLE key to rebuild the data table. In *Symphony* you'll need to select MENU Range What-If 2-Way and press Return three times to accept the Table range and the input cells you have already specified.

The third point is one that's probably apparent. The larger the data table, the longer it will take to recalculate. This is so because each time you build a data table, the worksheet is recalculated once for each value or set of values substituted into the input cell or cells. ■

Read This And We'll Never Interrupt You Again.

©3M 1989

When you're working, there's only one thing worse than being interrupted. Being interrupted by your own PC. But when you stop to format a disk, it makes you stare at a blank screen for about 2 minutes. Format the whole box, and you lose close to 20 minutes. And if you ever have to format a data cartridge tape, your machine is out of action for as much as 2 hours.

But if you use our formatted disks and cartridge tapes, you'll never be interrupted again. The disks come in 3.5″ and 5¼″ sizes. For the IBM PC, PS/2®, and compatibles. Our data cartridge tapes come in 10 to 150 Mbyte versions. All you do is take them out of the box and keep right on working. Of course, it helps to buy them first. So next time you need diskettes or data cartridge tapes, be sure to ask for 3M formatted products.

OK, we've taken enough of your time. Now you can get back to work.

For more information about formatted diskettes and data cartridge tapes, call 1-800-888-1889, ext. 45.
"IBM" and "PS/2" are registered trademarks of the IBM Corporation.

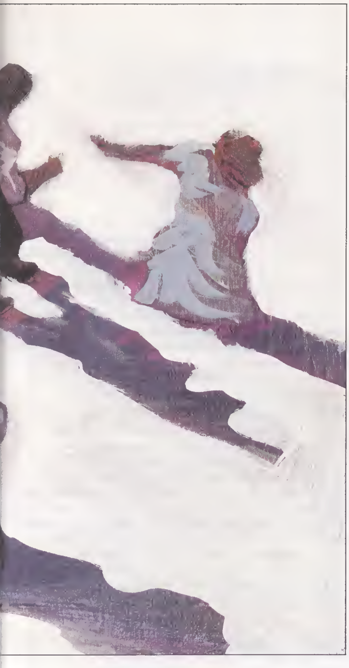
3M

Chart Your PROCESS FLOW

BY RICHARD CRANFORD

To find areas for improvement in a business system, create a visual model using *1-2-3* or *Symphony* and your printer.

KEVIN SHORT



The day-to-day operation of any business is the sum of its operational systems. Before radios can be sold, they have to be assembled. Before they can be assembled, the parts have to be procured from inventory. Before the parts are in inventory they have to be purchased from suppliers. Before they can be purchased, requisitions and purchase orders have to be processed. Like the proverbial chain, a business system is no more efficient than its weakest subsystem.

One technique for analyzing a system to be sure that it doesn't hold up the parade is to plot the system on a flow-process chart. Many operations specialists buy preprinted flowchart forms and fill them in with a pencil. The macro-driven worksheet presented here produces neat, readable flow-process charts on your printer. The model is designed to run in *1-2-3* Release 2.01 and higher or in *Symphony*.

Figure 1 shows a simplified version of a preprinted flow-process chart. To document a system on this chart, you categorize each activity in the system as operation, transportation, inspection, delay, or storage. These categories are represented by a circle, an arrow, a square, a half-circle, and a triangle, respectively. For each step you write the descriptions next to the step numbers and fill in one symbol. Then you connect the symbols that you filled in with lines. Finally, you write in a distance or time where appropriate and put check marks in the Recommendations columns to begin making plans for improving the system.

Figure 2 shows a flow-process chart created with *1-2-3* or *Symphony*. The five symbols are approximated by using typed characters. String-returning formulas in the rows between the symbols create the connecting lines using the slash, backslash, and underscore characters. You can print this form on 8½-by-11 inch paper if your printer can print at approximately 17 characters per inch. You can enhance the form's appearance if you set your printer to print eight rows per vertical inch instead of the usual six. We'll look at the mechanics of controlling your printer later.

As you can see, you must add by hand any distance-traveled or time-required numbers, recommendations, or notes. Consider this a starter system. Ambitious readers may want to add more macro programming that handles adding entries in these columns.

Build the worksheet according to the instructions on

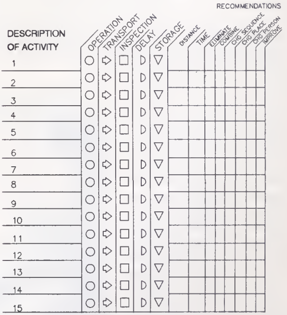


FIGURE 1. To use this blank flow-process chart, which is a standard form, you would write the names of activities, fill in the appropriate symbols, connect those symbols, and write additional information to the right of the symbols.

```
FLOW-PROCESS CHART                                                                                               QUETZAL INDUSTRIES

Job: FULFILLING REQUESTS FOR COMPUTER EQUIPMENT                                   RECOMMENDATIONS:
--------------------------------------------                                                Chg  Chg  Chg
Step Description                            Oper Tran Insp Del  Stor  Dist Time   Elim Comb Seq  Loc  Per  Impv Notes
---- -----------                            ---- ---- ---- ---- ----  ---- ----   ---- ---- ---- ---- ---- ---- -------------------

1    Move Equip from Receiving to Tech Svcs (_)  ++>  [_]  [_)  \_/   ____ ____   ____ ____ ____ ____ ____ ____ ___________________
                                                  \___
                                                      \
2    Verify Completeness of Order           (_)  ==>  [#]  [_)  \_/   ____ ____   ____ ____ ____ ____ ____ ____ ___________________
                                                       \___
                                                           \
3    Wait for Availability of Workbench     (_)  ==>  [_]  [#)  \_/   ____ ____   ____ ____ ____ ____ ____ ____ ___________________
                                             ______________/
                                             /
4    Install Peripherals                    (#)  ==>  [_]  [_)  \_/   ____ ____   ____ ____ ____ ____ ____ ____ ___________________
                                             \________
                                                      \
5    Test Equipment                         (_)  ==>  [#]  [_)  \_/   ____ ____   ____ ____ ____ ____ ____ ____ ___________________
                                                  ___/
                                                  /
6    Deliver Equipment to User              (_)  ++>  [_]  [_)  \_/   ____ ____   ____ ____ ____ ____ ____ ____ ___________________
                                                  \___
                                                      \
7    Test Equip in User's Area              (_)  ==>  [#]  [_)  \_/   ____ ____   ____ ____ ____ ____ ____ ____ ___________________
```

FIGURE 2. This spreadsheet-generated flowchart diagrams the process of filling computer-equipment requests. The connecting lines are formed by string-returning formulas that use the characters /, \, and _. Using the spreadsheet lets you avoid some penciling and produces neater charts. It also makes correcting and revising charts easier.

page 60. Then we'll look at how it can be used to document an operations problem at the hypothetical Quetzal Industries.

ANALYZING A SYSTEM

Quetzal Industries has been growing quickly. Most of its employees need personal computers to perform their duties, and the company is finding that it takes an unacceptably long time for new employees to get their equipment delivered. Quetzal has a relationship with a large supplier that can fill orders quickly, so the slowdown must be somewhere within the company.

Anne Bronte, Quetzal's senior operations analyst, is asked to analyze the process of getting computers from receiving to the people who've requested them. This process is handled by the five-person staff of Technical Services. These five people install special boards, such as graphics adapters; connect printers, monitors, and other peripherals; test equipment in the Technical Services lab; and deliver equipment to users, giving it one more test in a user's work area.

Pen and clipboard in hand, Anne observes a technician named Marie as she fulfills several computer-equipment requests. Anne breaks the task up into the following steps:

- Upon hearing that a shipment of computer equipment has arrived at receiving, Marie takes a wheeled table, or cart, to the receiving area, loads the shipment on the cart, and takes it back to the Technical Services lab.
- Marie checks the equipment against the purchase order and confirms that all the peripherals and accessories are included.
- If one of the other technicians is using the lab's workbench, Marie must find something else to do. As soon as the workbench is available, she unpacks the equipment, installs the circuit boards in the system unit, connects all the peripherals, formats the hard disk, and installs the operating system.
- Marie then runs a complete diagnostic check on the equipment.
- She loads the equipment back on the cart and wheels it to the office or cubicle of the person who requested it.
- She sets up the equipment.
- She runs a final test on the equipment.

After observing Marie fill several requests, Anne charts the process. She determines the appropriate category for each step that Marie goes through. Noting that Marie often has to wait for the workbench to become available, Anne adds a delay to the flow-process chart before the step for installing peripherals. The chart she develops resembles the one in figure 2.

MATCHING THE MODEL TO YOUR PRINTER

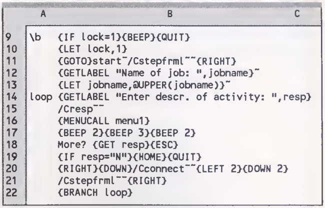
Before learning how to use the template to create a flow-process chart for the computer-delivery process, let's deal with printer settings. If you have a wide-carriage printer, you may prefer to print the chart on wide paper using normal-size characters. If you want to print on 8½-by-11 inch paper, you must use a printer-control code for condensed, or compressed, type. The correct code depends on the printer's brand. Its manual will tell you the correct code. For Epson printers and some other brands of dot-matrix printers, the code is \015. For Hewlett-Packard LaserJet printers (with the exception of the original LaserJet, which has no Line Printer font) use the string \027E\027(s16.66H to get the compressed Line Printer font in portrait mode.

To make the connecting characters appear closer together, enter the control code for 8 lines per inch. For Epson printers, for example, the code is \0270. For HP LaserJets, the code is \027&l8D (the character after the & is a lowercase L).

For more information on using control codes to set your printer's attributes, see *Setup Strings Can Control Printing* on page 63 of the March 1989 issue.

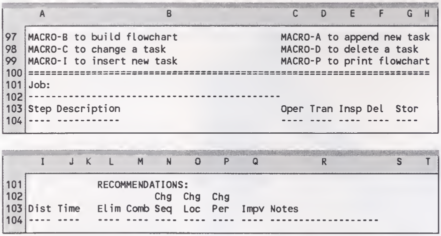
Besides the printer control strings, you must also set the left margin to 0 and the right margin to 132. If you've entered a control code to print 8 lines per inch, you must set the page length to 88. You may also wish to set a page header, although this is optional. In figure 2 the words *FLOW-PROCESS CHART* and *QUETZAL INDUSTRIES* make up a page header.

To enter these settings in *1-2-3*, select /Print Printer Options Setup and enter the appropriate control codes. Then select Margins Left, enter *0,* select Margins Right, and enter *132*. To specify 88 lines per page, select Pg-Length and enter *88*. If you want a header, select Header, enter *FLOW-PROCESS CHART*, two split vertical bars (¦¦), and the name of your company. Then select Quit Quit.



```
    A                  B                                 C

9   \b   {IF lock=1}{BEEP}{QUIT}
10       {LET lock,1}
11       {GOTO}start~/Cstepfrml~~{RIGHT}
12       {GETLABEL "Name of job: ",jobname}~
13       {LET jobname,@UPPER(jobname)}~
14  loop {GETLABEL "Enter descr. of activity: ",resp}
15       /Cresp~~
16       {MENUCALL menu1}
17       {BEEP 2}{BEEP 3}{BEEP 2}
18       More? {GET resp}{ESC}
19       {IF resp="N"}{HOME}{QUIT}
20       {RIGHT}{DOWN}/Cconnect~~{LEFT 2}{DOWN 2}
21       /Cstepfrml~~{RIGHT}
22       {BRANCH loop}
```

FIGURE 4. This macro prompts the user for the name of the operation being analyzed and then for the name of each activity in the operation. After placing the name of a task at the current location of the cell pointer, it calls a menu routine that lets the user select a type of activity. The macro asks the user if there are more activities. If so, it copies string-returning formulas that create the connecting lines and resumes processing at the cell named *loop*.



```
      A                    B                      C    D    E    F    G H

97  MACRO-B to build flowchart                  MACRO-A to append new task
98  MACRO-C to change a task                    MACRO-D to delete a task
99  MACRO-I to insert new task                  MACRO-P to print flowchart
100 ==================================================================
101 Job:
102 --------------------------------------------
103 Step Description                            Oper Tran Insp Del  Stor
104 ---- -----------                            ---- ---- ---- ---- ----
```

```
      I    J K    L    M    N    O    P    Q            R           S    T

101                RECOMMENDATIONS:
102                          Chg  Chg  Chg
103 Dist Time    Elim Comb Seq  Loc  Per  Impv Notes
104 ---- ----    ---- ---- ---- ---- ---- ---- ------------------
```

FIGURE 3. This area of the worksheet contains the flowchart's column headings. The figure at the top shows the upper portion of the model's work area. The labels and dividing line in rows 97 to 100 appear on the screen at all times. The figure at the bottom shows the headings for the printed chart's additional columns.

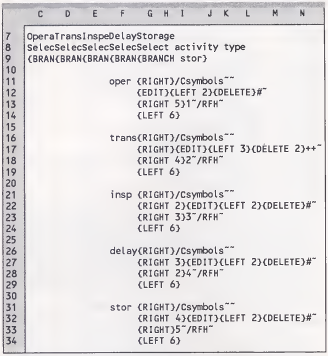
To enter the settings in *Symphony*, select SERVICES Print Settings Init-String, and enter the appropriate control codes. Then select Margins Left, enter 0, select Right, enter *132*, and select Quit. To specify 88 lines per page, select Page Length and enter *88*. If you want a header, select Header, enter *FLOW-PROCESS CHART*, two split vertical bars (¦¦), and the name of your company. Then select Quit Quit Quit.

Once you've added the setup strings and changed the margins, save the worksheet.

USING THE MODEL

Now you're ready to create a chart. Figure 3 shows how your worksheet looks when you begin to use it. The six labels in rows 97 to 99 tell you the key combinations you'll use to build a chart and to make changes to it. The build macro appears in figure 4. Start this macro by holding down the MACRO key (Alt on most computers) and pressing B. You see the prompt *Name of job* in the control panel. Enter *fulfilling requests for computer equipment*. For this prompt, it doesn't matter if you use capital or lowercase letters because the macro converts whatever you enter to uppercase.

Next you see the prompt *Enter descr. of activity*. Enter *Move Equip from Shipping to Tech Svc*. A menu listing five types of activities appears in your screen's control panel. (The macros



```
     C    D    E    F    G  H  I    J  K   L    M    N
7   OperaTransInspeDelayStorage
8   SelecSelecSelecSelecSelect activity type
9   {BRAN{BRAN{BRAN{BRAN{BRANCH stor}
10
11                 oper {RIGHT}/Csymbols~~
12                      {EDIT}{LEFT 2}{DELETE}#~
13                      {RIGHT 5}1~/RFH~
14                      {LEFT 6}
15
16                 trans{RIGHT}/Csymbols~~
17                      {RIGHT}{EDIT}{LEFT 3}{DELETE 2}++~
18                      {RIGHT 4}2~/RFH~
19                      {LEFT 6}
20
21                 insp {RIGHT}/Csymbols~~
22                      {RIGHT 2}{EDIT}{LEFT 2}{DELETE}#~
23                      {RIGHT 3}3~/RFH~
24                      {LEFT 6}
25
26                 delay{RIGHT}/Csymbols~~
27                      {RIGHT 3}{EDIT}{LEFT 2}{DELETE}#~
28                      {RIGHT 2}4~/RFH~
29                      {LEFT 6}
30
31                 stor {RIGHT}/Csymbols~~
32                      {RIGHT 4}{EDIT}{LEFT 2}{DELETE}#~
33                      {RIGHT}5~/RFH~
34                      {LEFT 6}
```

FIGURE 5. These macros make up the activity menu. The exact contents of the overlapping labels in rows 7 through 9 are given in the setup box.

that produce this menu appear in figure 5.) Select a category for an activity by highlighting it and pressing Return or by typing the first letter of the category. For this activity, select Transportation. The macro copies the five symbols to the area just to the right of the description. Then it replaces the label ==> with ++> to approximate the appearance of a solid, or filled-in, arrow rather than the outline of an arrow.

Next, you see the prompt *More?* in the control panel. To answer yes to this prompt, type *y*, uppercase or lowercase, or simply press Return. To answer no, type *N* or *n*. For now, type *y*. The macro copies two string-returning formulas into the cells just below the (_) symbol. Initially, the formulas return ERR, but that will change when you enter the next activity.

Now you see the prompt *Enter descr. of activity* again. Enter *Verify Completeness of Order*. When the menu appears, select Inspection. Again, the macro copies the symbols, this time replacing [_] with [#]. Note that the two ERRs from the last step are gone, replaced by a connecting line between the transportation symbols for the first activity and the inspection symbols for the second activity. At the *More?* prompt, type *y* or Return. Two more ERRs appear, and again you're prompted for an activity description.

Continue entering descriptions and selecting the appropriate activity types according to the labels and descriptions in figure 2. If you make any mistakes, just continue—you can go back and correct them after you enter all the activities. Answer yes to the *More?* prompt until you've finished the seventh activity, *Test Equip in User's Area*. After entering that label and selecting Inspection from the menu, type *n*. The macro moves the cell pointer to cell A101 and ends.

Once you've built the flowchart, you can correct or revise it by using the change, insert, append, and delete macros shown in figure 6. If you wish to change any of the activity descriptions you entered or change the type of an activity, position the cell pointer anywhere on the row containing the activity and press MACRO-C. This invokes a macro that automatically moves the cell pointer to column B and then pauses while you enter or edit a label and press Return. If you don't wish to change the label, just press Return.

You next see the question *Do you wish to change activity type? <Return=No>* in the control panel. Press Return if you don't need to make changes to the symbols to the right of the cell pointer. If you do need to fill in different symbols, type *y*, but don't press the Return key. The menu that you saw while initially entering activities reappears. Select the new activity type. The macro replaces symbols and fills in appropriate symbols. The lines that connect the symbols that are filled-in adjust automatically.

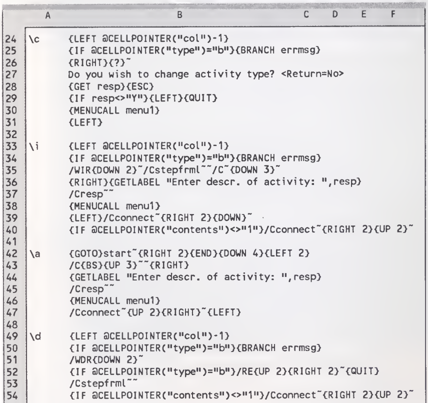
If you only need to change the description of an activity, you can, alternatively, move the cell pointer to the cell containing that description and edit it or reenter the label.

You can insert a new activity between ones that already exist. Suppose that the technician must record the serial numbers of the computer equipment before installing the peripherals. Position the cell pointer anywhere on the row containing the label *Install Peripherals* and press MACRO-I. This starts a macro that inserts three empty rows into the worksheet above the *Install Peripherals* row, adjusts the step numbers, moves the cell pointer to column B, and prompts you for an activity description. Enter *Record Serial Numbers*. The activity menu returns to the control panel. Select Operation, and the macro copies a new set of symbols,

fills in the (_) symbol, and copies a new set of connecting-line formulas.

Adding a new activity after the final step is a similar process. With the cell pointer anywhere in the worksheet, press MACRO-A. This macro moves the cell pointer to the cell that's three rows below the last step number, creates a new step-number formula, then moves the cell pointer to column B and prompts you for a description. Enter *User Signs for Equipment*. When the activity menu appears, select Operation.

To delete a step, place the cell pointer anywhere on the row containing that step and press MACRO-D. Try this with the activity you just appended to the chart. The delete macro deletes three rows from the worksheet. Since the activity you've deleted is the last step, this macro erases the two symbol-connection formulas above it. Now move the cell pointer to the row containing the label *Record Serial Numbers* and press MACRO-D. This time the macro deletes three rows and copies a new step-number formula and a new set of symbol-connection formulas to appropriate cells.



```
        A                          B                         C    D    E    F
24  \c      {LEFT @CELLPOINTER("col")-1}
25          {IF @CELLPOINTER("type")="b"}{BRANCH errmsg}
26          {RIGHT}{?}~
27          Do you wish to change activity type? <Return=No>
28          {GET resp}{ESC}
29          {IF resp<>"Y"}{LEFT}{QUIT}
30          {MENUCALL menu1}
31          {LEFT}
32
33  \i      {LEFT @CELLPOINTER("col")-1}
34          {IF @CELLPOINTER("type")="b"}{BRANCH errmsg}
35          /WIR{DOWN 2}~/Cstepfrml~~/C~{DOWN 3}~
36          {RIGHT}{GETLABEL "Enter descr. of activity: ",resp}
37          /Cresp~~
38          {MENUCALL menu1}
39          {LEFT}/Cconnect~{RIGHT 2}{DOWN}~
40          {IF @CELLPOINTER("contents")<>"1"}/Cconnect~{RIGHT 2}{UP 2}~
41
42  \a      {GOTO}start~{RIGHT 2}{END}{DOWN 4}{LEFT 2}
43          /C{BS}{UP 3}~~{RIGHT}
44          {GETLABEL "Enter descr. of activity: ",resp}
45          /Cresp~~
46          {MENUCALL menu1}
47          /Cconnect~{UP 2}{RIGHT}~{LEFT}
48
49  \d      {LEFT @CELLPOINTER("col")-1}
50          {IF @CELLPOINTER("type")="b"}{BRANCH errmsg}
51          /WDR{DOWN 2}~
52          {IF @CELLPOINTER("type")="b"}/RE{UP 2}{RIGHT 2}~{QUIT}
53          /Cstepfrml~~
54          {IF @CELLPOINTER("contents")<>"1"}/Cconnect~{RIGHT 2}{UP 2}~
55
56  \p      {WINDOWSOFF}{PANELOFF}
57          /PPCRRhead~R{RIGHT}{END}{DOWN}{LEFT}{END}{UP}~
58          {GETLABEL "Get printer ready and press Return ",resp}
59          AGPQ
60
61  \w      {BLANK jobname}{GOTO}start~
62          /RE{RIGHT 2}{END}{DOWN}{RIGHT 15}~
63          {LET lock,0}
64
65  errmsg  Pointer must be on a row containing a step number.
66          {GET resp}{ESC}
67
68  resp
69
70  lock
```

FIGURE 6. This area of the model contains the change, insert, append, and delete macros used for correcting and revising the chart; the print macro; and the wipe macro for erasing the entire chart. The *errmsg* macro is invoked if you press MACRO-C, MACRO-I, or MACRO-D without first placing the cell pointer in a row containing a step number. The cell named *resp* is used to hold your responses to various prompts. The cell named *lock* is used by the build macro to prevent use of that macro once a chart has been built. Column A in this figure is wider than in the actual worksheet in order to provide visual clarity.

The change, insert, and delete macros contain instructions that keep them from working if the cell pointer is not on a row containing a step number when you invoke them. Try placing the cell pointer between any two steps and pressing MACRO-C, MACRO-I, or MACRO-D. The cell pointer moves to column A (if it's not there already), and the message *Pointer must be on a row containing a step number* appears in the control panel. Press any key to clear the message.

The worksheet's other safety mechanism is in the build macro. Once you've built a chart, you can no longer invoke the build macro. However, you can erase the chart you've built and at the same time reset the lock in the build macro by pressing MACRO-W (for wipe). The wipe macro appears in figure 6. Before you do this, be sure you really don't want the chart you've created.

To print a hard copy of the flow-process chart you have created, you simply press MACRO-P. The print macro, which is shown in figure 6, automatically sets the correct print range, then prompts you to set up the printer. This is usually just a matter of lining up the top of a new page with the top of the print head. When you're ready, press Return, and the flowchart will be printed.

INTERPRETING THE RESULTS

The printed chart you've just created indicates that Step 3 is the delay in the process. Remember that Quetzal's problem is that new staff do not get PCs delivered in a timely way. The solution would seem to be to install another one or two workbenches in the Technical Services lab.

If that isn't practical, another solution might be to find a time when the user will be away from his or her office for an hour or so. During that time, the technician could install the peripherals and do the diagnostic tests *in situ*. This would have the advantage of reducing the overall number of steps because there would be one complete test instead of a test in the lab and a retest in the work area.

It's easy to spot this delay without charting the seven-step process in the Quetzal Industries problem. But if you were to analyze a 30-step process you might find three or four delays. Some of them might be unavoidable. Having the printed flowchart should help you focus on the delays that could be eliminated or reduced. ■

Richard Cranford is associate editor of features at LOTUS.

HOW TO SET UP THE WORKSHEET FOR THE FLOW-PROCESS CHART

1. Releases

This model runs in *1-2-3* Releases 2.01, 2.2, and 3 and in *Symphony* Release 2.0.

2. Default column width: 5

1-2-3: /Worksheet Global Column-Width, enter *5*
Symph: MENU Settings Width, enter *5*, select Quit

3. Individual column widths

Column	Width
B	39
H	1
K	2
R	20

For example, to set the width of column B, move the cell pointer to column B and select

1-2-3: /Worksheet Column Set-Width, enter *39*
Symph: MENU Width Set, enter *39*

4. Labels

Enter the labels shown in figures 3a and 3b. Enter \= (a backslash and an equal sign) in cell A100 and copy that cell to range B100..H100. Enter \– in cell A102 and copy that cell to cell B102. Type an apostrophe and enter four hyphens ('----) in cell A104. Copy cell A104 to ranges C104..G104, I104..J104, and L104..Q104. Type an apostrophe and enter 11 hyphens in cell B104. Type an apostrophe and enter 19 hyphens in cell R104.

Enter the following labels in the cells indicated:

Cell	Label
C1	'(_)
D1	'==>
E1	'[_]
F1	'[_)
G1	'_/

Enter four underscores in cells I1 and J1, and copy cell I1 to range L1..Q1. Enter 19 underscores in cell R1.

Enter the labels shown in figure 4. In *Symphony* replace the slash with {MENU} in cells B15, B20, and B21.

Enter the following labels in the cells indicated:

Cell	Label
C7	Operation
D7	Transportation
E7	Inspection
F7	Delay
G7	Storage
C8	Select activity type

Copy cell C8 to range D8..G8.

```
C9   {BRANCH oper}
D9   {BRANCH trans}
E9   {BRANCH insp}
F9   {BRANCH delay}
G9   {BRANCH stor}
```

Enter the remaining labels shown in figure 5. Make the following substitutions for *Symphony*:

Cells G11, G16, G21, G26, and G31: {RIGHT}{MENU}Csymbols~~

```
G13  {RIGHT 5}1~{MENU}FOH~
G18  {RIGHT 4}2~{MENU}FOH~
G23  {RIGHT 3}3~{MENU}FOH~
G28  {RIGHT 2}4~{MENU}FOH~
G33  {RIGHT}5~{MENU}FOH~
```

Enter the labels shown in figure 6. In *Symphony* make the following substitutions:

```
B35  {MENU}IR{DOWN 2}~
       {MENU}Cstepfrml~~
       {MENU}C~{DOWN 3}~
B37  {MENU}Cresp1~~
B39  {LEFT}{MENU}Cconnect~{RIGHT 2}
       {DOWN}~
B40  {IF @CELLPOINTER("contents")
       <>"1"}{MENU}
       Cconnect~{RIGHT 2}{UP 2}~
B43  {MENU}C{BS}{UP 3}~~{RIGHT}
B45  {MENU}Cresp1~~
B47  {MENU}Cconnect~{UP 2}
       {RIGHT}~{LEFT}
B51  {MENU}DR{DOWN 2}~
B52  {IF @CELLPOINTER("type")="b"}
       {MENU}E{UP 2}
       {RIGHT 2}~{QUIT}
B53  {MENU}Cstepfrml~~
B54  {IF @CELLPOINTER("contents")
       <>"1"}{MENU}
       Cconnect~{RIGHT 2}{UP 2}~
B57  {SERVICES}PSSCSRhead~SR{RIGHT}
       {END}{DOWN}
       {LEFT}{END}{UP}~Q
B62  {MENU}E{RIGHT 2}{END}{DOWN}
       {RIGHT 15}~
```

5. Range names

Assign names to individual cells in column B by using the labels in column A: Press slash (*Symph*: MENU), select Range Name Labels Right, and specify range A9..A70. Assign names to cells in column G by using the labels in column F: Press slash (*Symph*: MENU), select Range Name Labels Right, and specify range F11..F31.

Create these additional range names:

Name	Range
symbols	C1..R1
connect	C2..C3
stepfrml	C5
menu1	C7
head	A101..R104
start	A106
jobname	B101

For example, to assign the name to range C1..R1, press slash (*Symph*: MENU), select Range Name Create, enter *symbols*, and specify range C1..R1.

6. Formulas

```
Cell Formula
C2   @IF(H1>H4,@REPEAT(" ",(H4-1)*
       5+2)&@REPEAT("_",(H1-H4)*
       5-2)&"/",@REPEAT(" ",1+(H1-1)
       *5)&@IF(H1=H4,"¦","\"&
       @REPEAT("_",(H4-H1)*5-2)))
C3   @IF(H4>H1,@REPEAT(" ",(H4-1)*
       5)&"\", @REPEAT(" ",(H4-1)
       *5+1)&@IF(H1=H4,"¦","/"))
C5   @IF(C2="Step","1",@STRING
       (@VALUE(C2)+1,0))
```

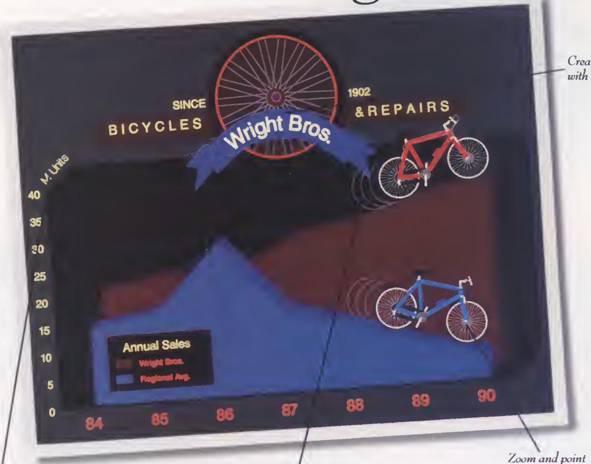
These formulas return ERR when you enter them.

7. Titles: rows 97 through 100

Press Home, press GOTO, and enter *A97*. Press DownArrow four times and then select

1-2-3: /Worksheet Titles Horizontal
Symph: MENU Settings Titles Horizontal Quit

Add These Extras For Nothing Extra.



Create logos with circular text

Rotate text to enhance charts

Highlight objects or text with sweep effects

Zoom and point edit for more finished images

Introducing Draw Partner,™ a drawing package that adds power and pizzazz to a presentation without costing one cent extra. Designed especially to work with Harvard Graphics™ from Software Publishing Corporation, this new accessory is free with every purchase of Harvard Graphics.

Draw Partner combines the advanced tools you'd look for in a high-end drawing program with the ease of use Harvard Graphics is famous for. Users can now zoom in for detail work. Point edit for finely tuned images. Sweep, rotate or flip text and objects. Even create dazzling logos with circular text. And that's just for starters. Match up Draw Partner with number-one selling Harvard Graphics and you've got the most powerful presentation graphics solution available.

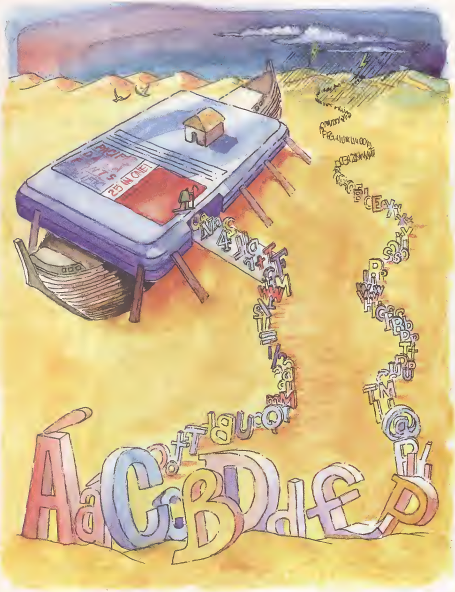
So talk to your dealer and find out how to get a lot of extras for nothing. But do it soon. Nothing this good lasts forever.

Current Harvard Graphics users: see your dealer to purchase Draw Partner separately at a special introductory price.
Runs on IBM PC and MS DOS compatibles. ©1989 Software Publishing Corporation, 1901 Landings Drive, Mountain View, CA 94039-7210

SPC SOFTWARE PUBLISHING CORPORATION

FOR DEMONSTRATION DISKS CALL 1-800-345-2888 OPERATOR 53.

In Canada call 1-416-566-0566.



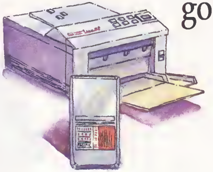
25 Cartridges in One!™— 172 fonts and 20 symbol sets in one cartridge.

Not that long ago printing with more than one font seemed like it took 40 days and 40 nights. You had to wait to download soft fonts. Or you had to switch any number of cartridges in and out looking for the right font.

Then along came Pacific Data Products. Now you have fast and easy, yet economical access to more high-quality fonts and symbols than ever before. And there's also increased symbol set support including international symbols, currency and diacritical marks.

25 Cartridges in One! is ideal for almost any type of application—like word processing, presentation graphics, and spreadsheet publishing. With 19 printer drivers included, there's increased support for most of the popular software packages.

Now that it's loaded with 172 fonts and 20 symbol sets, go ahead—print up a storm.



25 Cartridges in One! is fully compatible with the HP LaserJet Series II, IID, and the new HP LaserJet IIP.

For the dealer that carries *25 Cartridges in One!* in your area, call Pacific Data Products at (619) 552-0880.

Pacific Data Products— Plug into Power

PACIFIC
DATA PRODUCTS

9125 Rehco Road, San Diego, CA 92121
(619) 552-0880, Fax: (619) 552-0889

25 Cartridges in One! is a trademark of Pacific Data Products, Inc. All other company and product names are trademarks of the company or manufacturer respectively. © 1989 Pacific Data Products, Inc.

CIRCLE 105 ON READER SERVICE CARD

HOW TO WIN WITH FINANCIAL LEVERAGE

Here's a way to assess the leverage impact of preferred stock or debt.

BY STEPHEN L. NELSON

The annals of modern business are rife with tales of corporate fortunes won and lost as a result of financial leverage. Financial leverage assures an investor (a person expanding his business or plant) of a fixed financing cost regardless of the outcome of the investment. It is attractive because it tends to magnify profits from investment. But it can also magnify losses from investment.

In a leveraged investment, fixed financing costs increase the effect that a change in gross earnings has on earnings per share. When times are good, a leveraged investment—either a fixed-interest loan or a preferred-stock agreement—brings in more money than is paid out to lenders. When times are bad, leverage causes problems because small profits are used up by paying guaranteed returns to lenders.

This worksheet and the XY graph it gener-

BOB DAHM

ates illustrate the effects of financial leverage. The worksheet calculates the impact of three kinds of financing—common-stock, preferred-stock, and debt—on any investment. You can compare the results on a graph that plots earnings before interest and taxes (EBIT) against earnings per share (EPS).

If you're not familiar with the concept of financial leverage, read "How Financial Leverage Works" on page 66. If you are familiar with financial leverage, build the worksheet and graph by following the instructions on the opposite page. Then use the balance of this article as a guide to entering data, understanding the calculations, and interpreting graphic output.

MODEL INPUT

To adapt the worksheet in figure 1 to your own investment needs, follow these guidelines for entering data:

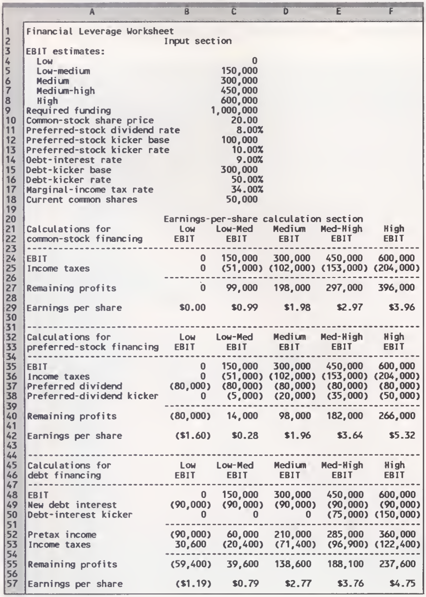
Range C4..C8: In these cells enter values representing a range of estimates of earnings before interest and taxes (EBIT). The worksheet accepts five estimates. When you make these entries, use estimates that cover a range of possibilities, from low to high. In the example, the EBIT estimates are evenly spaced at $150,000 intervals. However, you do not need to use even intervals. When *1-2-3* and *Symphony* plot the graph, they automatically scale the graph's X axis to whatever EBIT values you enter.

Cell C9: Required funding, which is entered in this cell, is the amount of money you need to raise. You can raise money from common stock, preferred stock, or debt. The common-stock alternative lets you test profits with no leverage. Preferred-stock funding and debt are leverage tools.

Cell C10: The common-share price in cell C10 is where you enter the price per share at which new shares of common stock will be sold. For a sole proprietorship or for a partnership, use $1 as the common-share price. If you're exploring financial leverage for a sole proprietorship, you do not need to enter anything in cells C11..C13. If you're exploring financial leverage for a partnership, use the preferred-stock category to enter contributions made by partners who receive a preferential return on their investment. The worksheet treats a partnership as if it were a preferred-stock agreement.

Cell C11: The preferred-dividend rate in this cell is the annual return to which preferred investors are entitled. For example, if an investor gets an 8% preferred return on his investment, enter .08.

Cells C12 and C13: Sometimes a preferred investor receives an additional return called a kicker. This return is usually



```
                 A                      B         C         D         E         F
 1  Financial Leverage Worksheet
 2                               Input section
 3  EBIT estimates:
 4    Low                                          0
 5    Low-medium                             150,000
 6    Medium                                 300,000
 7    Medium-high                            450,000
 8    High                                   600,000
 9  Required funding                       1,000,000
10  Common-stock share price                   20.00
11  Preferred-stock dividend rate              8.00%
12  Preferred-stock kicker base              100,000
13  Preferred-stock kicker rate               10.00%
14  Debt-interest rate                         9.00%
15  Debt-kicker base                         300,000
16  Debt-kicker rate                          50.00%
17  Marginal-income tax rate                  34.00%
18  Current common shares                     50,000
19
20                               Earnings-per-share calculation section
21  Calculations for                 Low   Low-Med    Medium  Med-High      High
22  common-stock financing          EBIT      EBIT      EBIT      EBIT      EBIT
23                             ---------------------------------------------------
24  EBIT                               0   150,000   300,000   450,000   600,000
25  Income taxes                       0  (51,000) (102,000) (153,000) (204,000)
26                             ---------------------------------------------------
27  Remaining profits                  0    99,000   198,000   297,000   396,000
28
29  Earnings per share             $0.00     $0.99     $1.98     $2.97     $3.96
30
31  ------------------------------------------------------------------------------
32  Calculations for                 Low   Low-Med    Medium  Med-High      High
33  preferred-stock financing       EBIT      EBIT      EBIT      EBIT      EBIT
34  ------------------------------------------------------------------------------
35  EBIT                               0   150,000   300,000   450,000   600,000
36  Income taxes                       0  (51,000) (102,000) (153,000) (204,000)
37  Preferred dividend          (80,000)  (80,000)  (80,000)  (80,000)  (80,000)
38  Preferred-dividend kicker          0   (5,000)  (20,000)  (35,000)  (50,000)
39                             ---------------------------------------------------
40  Remaining profits           (80,000)    14,000    98,000   182,000   266,000
41
42  Earnings per share           ($1.60)     $0.28     $1.96     $3.64     $5.32
43
44  ------------------------------------------------------------------------------
45  Calculations for                 Low   Low-Med    Medium  Med-High      High
46  debt financing                  EBIT      EBIT      EBIT      EBIT      EBIT
47  ------------------------------------------------------------------------------
48  EBIT                               0   150,000   300,000   450,000   600,000
49  New debt interest           (90,000)  (90,000)  (90,000)  (90,000)  (90,000)
50  Debt-interest kicker               0         0         0  (75,000) (150,000)
51                             ---------------------------------------------------
52  Pretax income               (90,000)    60,000   210,000   285,000   360,000
53  Income taxes                  30,600  (20,400)  (71,400)  (96,900) (122,400)
54                             ---------------------------------------------------
55  Remaining profits           (59,400)    39,600   138,600   188,100   237,600
56
57  Earnings per share           ($1.19)     $0.79     $2.77     $3.76     $4.75
```

FIGURE 1. This financial leverage worksheet uses the data in range C4..C18 to calculate earnings per share for three investment methods. Formulas in range B24..F29 return the results for common stock; formulas in range B35..F42 return the results for preferred stock; and formulas in range B48..F57 return the results for debt financing.

calculated as the percent of EBIT over a base amount. In this case, enter the base amount in cell C12, and enter the percent as the preferred-stock kicker rate in cell C13. For example, suppose that a preferred investor receives 10% of the amount by which EBIT exceeds $100,000. In that case, enter 100000 in cell C12 and .1 in cell C13.

Cell C14: The debt-interest rate is the annual interest rate that you pay on the loan if you borrow the money. In the example, this rate is 9%.

Cells C15 and C16: Debt agreements can also have kickers. When this is the case, the lender receives a percentage of the excess profits. For example, if a lender would receive 50% of the amount by which EBIT exceeded $300,000, you would enter 300000 in cell C15 and .5 in cell C16.

Cell C17: To calculate taxes, you must enter a marginal-income tax rate. In the example, the marginal-income tax rate in cell C17 is 34%.

Cell C18: You enter in cell C18 the number of shares of stock outstanding before receiving financing. In the example that number is 50,000. For a sole proprietorship or for a partnership, enter the dollar value of the sole proprietor's or the partners' investments prior to seeking the required financing. More on this in a minute.

UNDERSTANDING THE FORMULAS

The model calculates EPS, or the earnings per dollar of investment in a partnership or sole proprietorship, over a range of profits.

The first financing method, common stock, provides no leverage. Common-stock calculations are in range B24..F29. The remaining profits for common-stock holders are calculated by subtracting income taxes from EBIT. Income taxes are calculated by multiplying the marginal-income tax rate in cell C17 by the range of EBIT values in row 24. To calculate EPS, the model divides the remaining profits listed in row 27 by the total number of common shares that will be outstanding after financing.

The model calculates the total number of shares by adding the number of new shares to the current number of shares. It calculates the number of new shares by dividing the required amount of financing, in cell C9, by the price of a common share, in cell C10.

The next set of calculations, in range B35..F42, is for preferred-stock financing. Here's how they work.

First, income taxes are calculated by multiplying the marginal-income tax rate in cell C17 by the EBIT amounts. Next, the preferred dividend is calculated by multiplying the required amount of financing, in cell C9,

HOW TO SET UP THE LEVERAGE WORKSHEET

1. Releases

The model runs in *1-2-3* Releases 2, 2.01, 2.2, and 3 and in *Symphony 2.0.*

2. Default settings

Format: , 0 (*Symph*: Punctuated)

1-2-3: /Worksheet Global Format , enter 0
Symph: MENU Settings Format Punctuated, enter 0

Column width: 10

1-2-3: /Worksheet Global Column-Width, enter 10
Symph: MENU Settings Width, enter 10

3. Individual column widths

Column	Width
A	26
B	9

For example, to set the width of column A, place the cell pointer in column A, select

1-2-3: /Worksheet Column Set-Width, enter 26
Symph: MENU Width Set, enter 26

4. Cell formats

Format	Range
Currency 2	B29..F29, B42..F42, B57..F57
Percent 2 (*Symph*: % 2)	C11, C13..C14, C16..C17

For example, to set the format for range B29..F29, select

1-2-3: /Range Format Currency, press Return to accept the default of 2, specify range B29..F29 as the range to format
Symph: MENU Format Currency, press Return to accept the default of 2, specify range B29..F29 as the range to format

5. Labels

Enter all the labels shown in column A of figure 1. Precede the labels in range A4..A8 with two blank spaces. Enter the labels shown in cells B2 and B20. Enter the labels in range B21..F22. Center the labels in range B21..F22. Select /Range Label (*Symph*: MENU Range Label-Alignment) Center and indicate range B21..F22. Copy range B21..F22 to cell B32 and to cell B45. Enter the dashed lines in the cells indicated. Create dashed lines by entering \- or \= in a cell and copying this entry as required.

6. Values

Enter the values shown in range C4..C18.

7. Edit and copy formulas

Cell	Formula
B24	+$C$4
C24	+$C$5
D24	+$C$6
E24	+$C$7
F24	+$C$8
B25	-$C$17*B24
B27	@SUM(B23..B26)
B29	+B27/($C$18+$C$9/$C$10)

Copy range B25..B29 to range C25..F29. Copy range B24..F25 to cell B35. Copy range B24..F24 to cell B48.

Cell	Formula
B37	-$C$11*$C$9
B38	-$C$13*@MAX(B35-$C$12,0)
B40	@SUM(B34..B39)
B42	+B40/$C$18

Copy range B37..B42 to range C37..F42.

Cell	Formula
B49	-$C$14*$C$9
B50	-$C$16*@MAX(B48-$C$15,0)
B52	@SUM(B47..B51)
B53	-$C$17*B52
B55	@SUM(B51..B54)
B57	+B55/$C$18

Copy range B49..B57 to range C49..F57.

by the dividend rate of the preferred stock, in cell C11. The model assumes that the preferred dividend is paid, or at least is accrued, regardless of the EBIT.

The preferred-dividend kicker is calculated by multiplying the preferred-stock kicker rate in cell C13 by any excess in EBIT over the preferred-kicker base. The excess is calculated by an @MAX formula. It returns either the value of EBIT minus the preferred-kicker base or zero, whichever is greater.

The remaining profits in row 40 are calculated by subtracting the income taxes, the preferred dividend, and the preferred kicker from EBIT. To calculate EPS, the model divides the remaining profits in row 40 by the total number of common shares in cell C18. Because no new common shares are issued in preferred-stock financing, the total number of common shares hasn't changed.

The calculations for debt financing in range B48..F57 are similar to the calculations for preferred-stock financing. The interest on new debt is calculated by multiplying the required amount of financing, in cell C9, by the interest rate on the debt, in cell C14. The debt-interest kicker is calculated by multiplying the debt-kicker rate in cell C16 by any excess of EBIT over the debt-kicker base.

An @MAX formula returns either EBIT minus the debt-kicker base or zero, whichever is larger. The pretax income is calculated by subtracting the new interest and interest kicker amount from the EBIT.

Income taxes are calculated by multiplying the tax rate for marginal income in cell C17 by the pretax incomes in row 52. The model gets the remaining profits in row 55 by adding the pretax incomes in row 52 to the income taxes in row 53.

To calculate EPS for the debt-financing model, formulas divide the remaining profits in row 55 by the total number of common shares in cell C18.

INTERPRETING THE GRAPH

The graph in figure 2 provides insights into the effects of financial leverage. The three plotted lines show the effect on earnings per share of three financing methods over a range of EBIT values. The top line represents the most profitable financing method at a given level of EBIT.

In the example, common stock provides the most profitable financing method when EBIT is zero to almost

HOW FINANCIAL LEVERAGE WORKS

Financial leverage involves borrowing money for investment from a bank, a bondholder, or a partner. A corporation creates financial leverage by issuing preferred stock or debt in the form of bonds. A company does this in an effort to increase the profits it realizes on an investment.

Sole proprietors and partnerships create financial leverage by borrowing from banks or else by raising money from partners who desire preferred-investment returns.

No matter how it is done, bringing someone else into your investment by promising to pay them a set return—regardless of profits from an investment—creates financial leverage.

When the amount you have to pay an investor for using his money is less than the profits generated by his money, financial leverage increases your return. Alternatively, when the amount you pay for using an investor's money is greater than the profit, financial leverage reduces the profit and may produce losses.

Here's a simple example of how this works in a real estate deal. Suppose you want to invest $50,000 in real estate and discover two opportunities. First, you can purchase a single-family rental house for $50,000. Second, you can borrow $200,000 from the bank and buy an apartment building for $250,000.

We'll assume in both cases that the annual rate of return would be 10% of the purchase price. The house would produce $5,000 a year in profits. The apartment building would produce $25,000 a year.

But the bank loan costs you 9% in interest a year, or $18,000. Your overall profit on the apartment building, using financial leverage, would be $25,000 minus $18,000, or $7,000 a year. This is $2,000, or 40%, more than the $5,000 profit you would get on the rental house.

Say you invested in the apartment building. The larger profit on the leveraged investment results because you borrowed money for less than it earned. We said earlier that both investments would produce a profit equal to 10% of the purchase price. On the apartment building investment, however, you borrowed money for 9% that you invested at 10%. That created extra profits.

But financial leverage can also work against you. Suppose that the amount you can charge for rent in your locale decreased by 25% due to a downturn in the local economy caused by the loss of a major employer. In that case, the $50,000 rental house produces $3,750 in profits (25% less than $5,000). The $250,000 apartment building produces $18,750 in rents (25% less than $25,000).

In the apartment building investment, however, you pay $18,000 a year in interest. Thus your profits plummet to a mere $750. This is far less than the amount you would have earned in an unleveraged investment.

In essence, financial leverage amplifies your profits and your losses. Accordingly, your decision to use financial leverage needs to be made after looking at the effects of various kinds of financial leverage over a wide range of profits. That's exactly what the worksheet and the graph described here enable you to do.

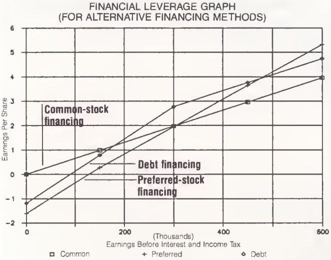


FIGURE 2. This graph illustrates the effect of financing methods on earnings per share. Note how the most profitable financing method changes as earnings before interest and taxes increase. The slope of a line indicates how sensitive earnings per share are to changes in EBIT. The steeper the slope, the greater the sensitivity. We've labeled the lines for clarity.

$200,000. When EBIT is between $200,000 and $500,000, debt financing produces the greatest profitability. Above $500,000, preferred-stock financing proves the most profitable. At the intersection of lines, the profit levels of two financing methods are equal.

The vertical distance between plotted lines indicates the effect of a leveraging method on EPS. For example, at an EBIT level of $150,000, financing with preferred stock instead of common stock decreases the EPS by almost $1. This is an example of negative financial leverage produced by preferred stock.

At an EBIT level of $300,000, however, preferred stock and common stock produce the same EPS. This is neutral financial leverage. Note that at the $300,000 level debt financing increases EPS by almost $1.

The slope of each line indicates how sensitive EPS is to changes in EBIT. The steeper the slope, the greater the sensitivity.

This is illustrated by the slope of the preferred stock and debt lines from EBIT amounts of $300,000 to $600,000. Over this range, a given change in EBIT results in a greater change in EPS in preferred-stock financing than in debt financing.

Financial leverage is a two-edged sword. It can magnify profits but it can also increase losses. This worksheet and graph can help you examine the impact of financial leverage as a financing method. As you examine various financing situations, remember that investment performance is crucial to the successful application of any leveraging strategy. ■

Stephen L. Nelson is a consultant in Seattle and the author of The Lotus 1-2-3 Money Manager, *published by Microsoft Press.*

HOW TO SET UP THE GRAPH

1. Graph type

Set graph type to XY.

1-2-3: /Graph Type XY Quit
Symph: MENU Graph 1st-Settings Type XY Quit

2. Data ranges

Set the following data ranges.

Data	Range
X	B24..F24
A	B29..F29
B	B42..F42
C	B57..F57

For example, to set the X data range, from the main Graph menu (accessed by /Graph in *1-2-3* or MENU Graph in *Symphony*), select

1-2-3: X, enter B24..F24, select the next graph range (such as A) or select Quit
Symph: 1st-settings Range X, enter B24..F24, select the next graph range (such as A) or select Quit Quit

3. Legends

Set the following legends for the A, B, and C data ranges:

Range	Legend
A	Common
B	Preferred
C	Debt

For example, to set the A data range legend from the main Graph menu, select

1-2-3: Options Legend A, enter *common*, select Legend B to enter the next legend, etc. Select Quit after entering the third legend to return to the main Graph menu.
Symph: 1st-settings Legend A, enter *common,* select B to enter the next legend, etc. Select Quit Quit after entering the third legend to return to the main Graph menu.

4. Titles

Set the following graph titles.

Title	Text
First	Financial Leverage Graph
Second	(For Alternative Financing Methods)
X-Axis	Earnings Before Interest and Income Tax
Y-Axis	Earnings Per Share

For example, to set the First title from the main Graph menu, select

1-2-3: Options Titles First, enter Financial Leverage Graph, select Titles Second, etc. Select Quit to return to the main Graph menu after all the titles are entered.
Symph: 2nd-Settings Titles First, enter Financial Leverage Graph, select Second, etc. Select Quit Quit to return to the main Graph menu once all the titles are entered.

5. Grid lines

To add horizontal and vertical grid lines from the main Graph menu, select

1-2-3: Options Grid Both Quit
Symph: 2nd-Settings Other Grid Both Quit

To display the graph from the main Graph menu, select

1-2-3: View
Symph: Preview

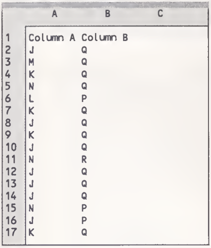
Q&A

ANSWERS TO YOUR QUESTIONS ABOUT LOTUS PRODUCTS

1-2-3/SYMPHONY

COUNTING ENTRIES

Q. My worksheet has several columns, each containing mixed letters, as shown in the figure below. I'd like to count the occurrences of selected characters. How can I get *1-2-3* to do this so that I won't have to do it manually?



	A	B	C
1	Column A	Column B	
2	J	Q	
3	M	Q	
4	K	Q	
5	N	Q	
6	L	P	
7	K	Q	
8	J	Q	
9	K	Q	
10	J	Q	
11	N	R	
12	J	Q	
13	J	Q	
14	J	Q	
15	N	P	
16	J	P	
17	K	Q	

Rhonda P. Maxwell
Bloomfield, N.Mex.

A. First, use the @DCOUNT command to count the occurrences of characters in a list. This function's syntax is @DCOUNT (*db,col,crit*) where *db* represents the list of data, including field names. *Col* identifies the column in the database that contains the character to tally. In the example that follows, this means, "Select the column that is zero columns to the right of the first column in the range." In other words, select the first column. *Crit* refers to a Criterion range that identifies the character you want to count.

The Criterion range for this calculation consists of two adjacent cells in a single column. The upper cell contains a field name that matches the one at the top of the column whose entries you want to tally. The lower cell contains the character whose occurrences you want to count.

To see how this works, start in a blank worksheet and enter the data shown in the previous figure. Then copy the label from cell A1 to cell D3. Now enter *j* in cell D4. The first few rows of your worksheet should appear as shown below.

To count the number of J's in column A, enter the following formula in cell D1:

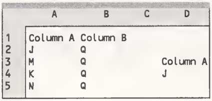
@DCOUNT(A1..A17,0,D3..D4)

The formula returns 7, revealing that there are seven J's in column A. To count the K's in column A, move the cell pointer to cell D4 and enter *k*. The formula returns 4.

To count the letters in column B, copy range D1..D4 to cell E1. Then edit the label in cell E3 to read *Column B*. The formula in cell E1 will count the occurrences in column B of whatever letter you enter in cell E4. Remember that the formula isn't necessarily case sensitive. That is, it depends on the drivers you installed during installation.

Apparently, an entry in column A of your worksheet can be only the letter J, K, L, M, or N. You can count occurrences of these letters by substituting each of the letters, one by one, into the Criterion range and recording the formula's result after each substitution. However, a Data Table (in *Symphony*, What-If Table) command can perform the task more quickly than you can.

Starting in cell C7, list all the letters that can occur in column A. In this case, you'd enter *j* in cell C7, *k* in cell C8, *l* in cell C9, and so on. Enter the formula +D1 into cell D6.



	A	B	C	D
1	Column A	Column B		
2	J	Q		
3	M	Q		Column A
4	K	Q		J
5	N	Q		

Select /Data Table 1 (in *Symphony*, MENU Range What-If 1-Way), indicate range C6..D11 as the Table range, then indicate cell D4 as the input cell. Tallies for each of the characters listed in column C appear in column D.

The Data Table command copies the first entry from the left column of the Table range (in this case, cell C7) into the input cell and calculates the answer. The command places the result in the adjacent cell, which is cell D7. The command continues to make calculations until it has used each value from the left column in the input cell. In *1-2-3* you can use the TABLE key to reissue the Data Table command.

WHAT'S A SETUP STRING?

Q. I inherited two setup strings from someone else, and I use them in many worksheets. I know that these strings darken the print and make it smaller, but that's all I know about setup strings. Can you tell me what each part actually means?

I have an Epson printer, if that matters, and the two strings I use are as follows:

\015\027\071

and

\015\0270\027G\027U

Donna Purtle
Horn Lake, Miss

A. A setup string (in *Symphony*, init-string) tells *1-2-3* or *Symphony* to send control codes to the printer. These control codes don't result in characters appearing on paper; rather they do such things as advance the paper by a line or a page, move the printer head to the left or right, change the spacing between characters or lines, and change the size, style, or emphasis of the type.

While control codes can be unique for each printer, many printer manufacturers use the same control codes. But you can never be sure what codes are available or what they do on your printer until you consult your manual.

Printer-control codes consist of sequences of ASCII codes. ASCII codes 0 through 31 generally fall into the category of control codes, while ASCII codes 32 and above typically produce printed characters. On Epson printers, not all of the lower 32 ASCII codes affect printing. ASCII code 15, however, does cause the printer to print condensed characters. The characters \015 in your setup string send the control code for condensed print.

In any setup string, the backslash tells *1-2-3* and *Symphony* that the three following characters comprise a single ASCII code. The ASCII code 27 means "escape." You represent it in a setup string as the characters \027. To the Epson printer, escape means "interpret the following character or characters as a printer-control sequence." In a sense, the ASCII code for escape is a switch that turns on the printer's receiver for control codes.

Your Epson printer understands that the escape code followed by the letter G means "strike every character twice." In your first setup string, G is represented by its ASCII code, 071. So the entire first setup string, \015\027\071, instructs the printer to condense the type and strike each character string twice. You could also write this setup string as \015\027G.

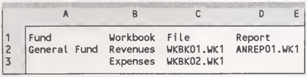
The latter format is exactly what appears in your second setup string. The first code in that string is \015, which, again, produces condensed print. The third code in the string is \027G, which causes your printer to strike each character twice. The string's second code is \0270, and it tells the printer to separate each line of the printout by an eighth of an inch. Typically, the line spacing is a sixth of an inch.

The code \027U in the second setup string turns bidirectional printing on and off. Your printer typically prints a line of text from the left to the right, then prints the next line from the right to the left, and so on. Turning off bidirectional printing improves the printer head's alignment.

Consult your printer's manual for a list of its control codes and their functions. There are control codes to turn various features on and off. Whenever you see the characters ESC in the printer manual, substitute the characters \027 in the setup string. When a setup string must contain an ASCII code that has no corresponding print or display character, use the ASCII code itself preceded by a backslash.

QUICK METHOD FOR RETRIEVING FILES

Q. To help me manage an involved system of *1-2-3* files, I record all the file names in one worksheet. Part of that listing appears in the following illustration:



	A	B	C	D	E
1	Fund	Workbook	File	Report	
2	General Fund	Revenues	WKBK01.WK1	ANREP01.WK1	
3		Expenses	WKBK02.WK1		

I'd like to be able to move the cell pointer around in the worksheet until it highlights a file name. Then, with a press of a key, I'd like to retrieve the file whose name is highlighted. Can I do this by using formulas or macros and not exceed the 26-macro limit? There are more than 60 files in my system.

Kevin E Pyle
Holmes County Court House
Millersburg, Ohio

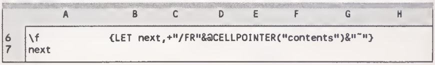
A. In *1-2-3* try the two-line macro that appears below.

In *Symphony* use the same macro, but replace the slash (/) with the {SERVICES} keyword.

To create the macro, enter the labels as shown. You need not enter labels in exactly the cells we've used. The macro will work anywhere in the worksheet.

Assign the labels shown in column A as range names for the adjacent cells to the right. In this case, assign the name *\f* to cell B6 and assign the name *next* to cell B7.

Before you use the macro, save the worksheet. Remember that the macro retrieves another worksheet, so anything that you haven't saved in this worksheet will be lost. Then move the cell pointer to the name of any file you want to retrieve, hold down the MACRO key (Alt on most computers), and press F.



```
     A              B      C      D      E      F      G      H
6    \f             {LET next,+"/FR"&@CELLPOINTER("contents")&"~"}
7    next
```

DATED GRAPHS

Q. Each month I update a worksheet and print several graphs from it. I'd like to have the date appear on each graph automatically so that I can tell at a glance which graph is the most recent. When I put the date in the graph titles, I run out of space and I have to update the titles each time I update the worksheet. Is there an easier way to go about this?

Martha Jean Holubec
General Physics Corp
Pottstown, Pa.

A. Unfortunately, there is limited space to put information in a graph. If you're already running out of space for your graph titles, our answer may not help you very much.

To display a date within the title of a graph, first enter the @NOW function in a cell in the worksheet and assign the cell a date format. When you assign the graph title, enter a backslash followed by the address of the cell that contains the formatted @NOW function.

For example, to assign the current date in a graph's X-axis title, you might enter the @NOW function in cell A1 and select /Range Format Date 1 (in *Symphony*, MENU Format Date 1) to assign a cell format. Then *1-2-3* users would select /Graph Options Titles X-Axis and enter *\a1*. *Symphony* users in a SHEET window would select MENU Graph 2nd-Settings Titles X-axis and enter *\a1*.

MOVE AND COPY

Q. I am intrigued by a difference in the behaviors of the Move and Copy commands. To illustrate the difference, consider that cells A1 and A3 contain the values 5 and 3, respectively, while cell C1 contains the formula +A1*2.

When I copy cell A3 to cell A1, the formula in cell C1 returns 6—as you'd expect. However, when I move cell A3 to cell A1, the formula in cell C1 returns ERR—it no longer refers to cell A1. The documentation tells me to expect this, but I'm curious to know why it happens. Why should copying a value cause a result different from that of moving a value?

Altaz Shivji
TPF&C
Calgary, Alberta

A. You can almost argue that the difference in behaviors of these commands is arbitrary. Consider that when you copy information from one cell or range to another, you aren't changing the fabric of the worksheet. Copying leaves the original information in place and writes a copy of the information in the target cells. Formulas that refer to the cells containing the original information continue to refer to those cells after the copy procedure.

To help you think about this, add another formula to your worksheet. The new formula should be in cell C3 and should read +A3/2. When you copy cell A3 to cell A1, the formula in cell C3 continues to read +A3/2.

When you move information, you actually alter the fabric of the worksheet. You essentially rip the source cell from the fabric, carry it to a new position, and sew it on there. When you move cell A3 to cell A1, you take along the formulaic references to cell A3. In your example the formula we entered in cell C3 now reads +A1/2 when you move cell A3 to cell A1—it no longer refers to cell A3 as you wanted it to.

Because a moved cell brings along all the references from its old location, it seems unlikely that you'll want it also to assume any references that were attached to its new location. If you think of moving a cell as ripping it out of its old location and putting it in a new location, you can see that the cell at the destination of the move must get out of the way. In the case of *1-2-3* and *Symphony*, a cell at the destination of a move operation simply vanishes and references to the cell evaluate to ERR.

DATE AND TIME IN SAME CELL

Q. I've read that the @NOW function will display the date and time. When I enter the function, I can format it to display the date or I can format it to show the time. I haven't been able to get it to show the date and the time. How can I get the date and time to appear in one cell?

Barbara Wieser
McKee City, N.J.

A. You can't make the date and time appear in a single cell, so you should consider using two cells to display them. Enter the @NOW function into two cells. Then assign a date format to one of the cells and a time format to the other.

NO SCROLLLOCK COMMAND

Q. Is there a macro command that is the equivalent of "press the ScrollLock key"? I can't figure out how to include this key in a macro.

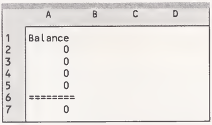
Joan D. Segedie
Glynwed Group Services Inc
Northbrook, Ill.

A. Neither a *1-2-3* nor a *Symphony* macro can press the ScrollLock, NumberLock, CapsLock, PrintScreen, Shift, Alt, or Control keys. A macro cannot press the COMPOSE-key or STEP-key combinations. A macro for *1-2-3* Release 2.2 cannot press the LEARN-, RUN-, or UNDO-key combinations. A macro for *1-2-3* Release 3 cannot press the RECORD-, RUN-, or UNDO-key combinations.

REVISITED

ZEROS SUPPRESSED

In the July 1989 Q&A, Bill McKee asked how to get a subtotal to display zero after he selected /Worksheet Global Zero Yes. His worksheet appears below:



```
        A         B         C         D

1  Balance
2         0
3         0
4         0
5         0
6  ========
7         0
```

The formula in cell A7 of this worksheet is @SUM(A2..A5). You suggested an alternative formula that displays a zero whether or not he suppressed zeros globally. Your formula was rather complicated, and it returns a label. I would like to suggest a simpler approach that returns a value.

Assign the fixed format with no decimal places to cell A7. Select /Range Format Fixed (in *Symphony*, MENU Format Fixed), enter 0, then indicate cell A7. Then enter the formula @SUM(A2..A5) +.0001 into cell A7. The resulting zero remains visible even after you suppress zeros, and the extra hundredth of a cent in the subtotal won't affect other calculations.

Mark A. Moritz
Phoenix, Ariz.

The editor replies: Thanks to all of our readers who wrote to suggest this alternative. This technique is most useful for visual display, not mathematical calculations. Any formulas that test whether the value in cell A7 is zero will evaluate incorrectly.

ANNOYING NUM INDICATOR

Last July Nancy Aldridge-Bloom complained that her Compaq Deskpro 286 computer activates the NumberLock key when she starts it up. We pointed out that this annoying mannerism afflicts many of today's computers, and we asked our readers to tell us how they deal with the problem.

The response was impressive. We received instructions on how to create BASIC programs and other executable files, on where to buy utility programs, and on which electronic bulletin boards carry public domain NumberLock disablers. Two of the suggestions we received stood apart from the others.

For Nancy Aldridge-Bloom and anyone else using a Compaq computer, the User Diagnostics disk that comes with the Compaq computer offers one solution. The disk contains a program file called SETUP.EXE. The program lets you set your computer's configuration. One of the selections on the program's menu is NumLock Power-On State. Set this to Off, and the NumberLock key will no longer be a bother.

Even if you don't have a system-configuration program, you can have your computer automatically shut off the NumberLock key so that you don't have to remember to do so. The technique relies on the DOS Debug program that resides in the directory that holds your DOS program files.

Start by creating a two-line file called LOCK.OFF in your computer's root directory. To do this in DOS, enter the command *cd \*. This command makes the root directory current. Then enter the command *copy con: lock.off*.

DOS responds by moving the cursor

Account	Amount	Denominations							
		$20	$10	$5	$1	$0.25	$0.10	$0.05	$0.01
A	$115.00	5	1	1	0	0	0	0	0
B	$101.25	5	0	0	1	1	0	0	0
C	$54.15	2	1	0	4	0	1	1	0
D	$130.26	6	1	0	0	1	0	0	1
E	$15.73	0	1	1	0	2	2	0	3
F	$26.99	1	0	1	1	3	2	0	4
G	$117.32	5	1	1	2	1	0	1	2
H	$7.20	0	0	1	2	0	2	0	0
I	$0.00	0	0	0	0	0	0	0	0

to the next line. Enter the following characters on two lines, as shown:

```
e 0:417 00
q
```

Press the F6 key followed by Return. DOS reports that it has copied one file.

Now modify your AUTOEXEC.BAT file. This file resides in your computer's root directory and contains commands that DOS follows automatically at start-up. You can use a word processor to edit the file, or you can use DOS's EDLIN command. Whichever approach you use, you must add the command:

```
c:\dos\debug < lock.off
```

In your version of the preceding command, replace the characters *c:\dos* with the path name to the directory that contains your DOS files. The LOCK.OFF file goes into memory at location 0000:0417. This is where the keyboard-status bits are located. It changes the bit for the NumberLock key to inactive. With the file named LOCK.OFF and the modified AUTOEXEC.BAT file, you should never again need to wrestle with the Number-Lock key when you start your computer.

Many thanks to G. James Van Osdol of The CareWare Company in Nokomis, Fla., Bob LaRochelle of Rutland, Vt., and all others who submitted suggestions.

CONVERTING FORMULA RESULTS TO VALUES

In June Jay Koppelman asked how to bring the current values of formulas from one worksheet into another. You suggested that he use the File Combine Add command to transfer the values, but you point out that this command leaves behind any labels that you might also want to combine. Then you suggested using the File Xtract command in the source file to create an intermediary file of values and labels that you later combine into the target worksheet.

I believe there is a more effective way to combine values and labels from one sheet into another. Start in the target worksheet and set global recalculation to manual. In *1-2-3* select /Worksheet Global Recalculation Manual.

Now use the File Combine Copy command to bring the desired range from the source file into the target file. With recalculation set to manual, the incoming formulas won't be recalculated and will reflect the values they last calculated in the source worksheet.

Use the Range Value command to transform the formulas to raw values and then reset worksheet recalculation to automatic.

A. Garry Finkell
Albany, N.Y.

The editor replies: Thanks for the suggestion. This technique should save some readers a lot of time.

1-2-3

EXTRACTED WORKSHEET FILES DON'T TRANSLATE

Q. I have never been able to use the Translate utility to convert an extracted worksheet file into a *dBase* III file. However, when I retrieve the extracted file into *1-2-3* and resave it under the same file name, I can translate it without a problem.

Am I doing something wrong? I'd save a lot of time if I didn't have to retrieve and save every file I extract before running the Translate utility.

Zak Sheikhi
Tehran, Iran

A. We couldn't reproduce the problem you describe, but apparently your file is missing the end-of-file mark, causing the Translate utility to fail. Unfortunately, you must retrieve and resave an extracted file to produce the needed marker.

CONTEST

NEW CONTEST

This month we are asking users of *1-2-3* and *Symphony* to submit the best method of determining the minimum number of bills and coins of each denomination needed to equal the total amount. For example, given the *Account* and *Amount* columns shown in the figure above, your method will return the denomination breakdown it takes to equal the amount for each account listed.

This contest idea was submitted by Keith Kirby of Scottsboro, Ala.

The first 25 people who submit entries that the *LOTUS* judges consider the best answer will receive a Lotus flight bag. Please send your answer on a nonreturnable disk along with a printout of your contest entry, documented with appropriate comments. All entries must be postmarked before midnight, February 28, 1990. Winners will be announced in the May 1990 issue. Send your answers to **February Contest**, *LOTUS* Magazine, P.O. Box 9123, Cambridge, MA 02139-9123.

Submit contest ideas to Q&A Contest Idea, *LOTUS* Magazine, P.O. Box 9123, Cambridge, MA 02139-9123. Include your solution, documented with appropriate comments. We'll pay $200 if we use your contest idea accompanied by a proven solution, $25 if we use your idea unaccompanied by a solution.

This material was prepared by Daniel Gasteiger and the Technical Editors.

WRITE US

Do you have a question? We can't answer every letter, but if yours is selected, we'll publish it along with an answer or a request to other readers for advice. We'll pay $25 for each letter we publish. Send your letters, including your address and daytime phone number, to: Q&A, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123.*

MORE TIPS ON USING LOTUS PRODUCTS

SYMPHONY

USING CODES IN A SYMPHONY FORM

Here's an idea to help speed up data entry and decrease typing errors while maintaining your *Symphony* Release 2.0 database.

In the database form in figure 1 below, two rows containing one-character codes have been added. When you make an entry in the FORM window, you can enter these codes instead of the actual location or cost-center number. *Symphony* will replace the code with the appropriate data.

First generate the form by using the data shown in range A1..A5 of figure 2 below. If you need help, refer to the *Symphony How-To Manual*. Then switch into the SHEET window. With the cell pointer in row 11, use the MENU Insert Rows command to insert two rows. Enter the codes and their associated cities in cells A11 and A12. In range C1..E4 create a table containing the codes, the cities, and the cost centers they represent, and name that table *codes*.

Enter the formulas that instruct *Symphony* to replace the codes you enter in FORM with the correct data from the table.

Cells E18 and E19 in the database Definition range each contain a formula. They are @VLOOKUP(G18,codes,1) and @VLOOKUP(G19,codes,2), respectively. The syntax of the @VLOOKUP formula follows:

@VLOOKUP(*selector_value, column_range,offset_number*)

Selector_value is the code that you enter; *column_range* is the range containing the codes, locations, and cost-center numbers; and *offset_number* is the column that contains the data you are searching for.

When you enter a code in the *Location* or *CostCtr* fields in the FORM window, *Symphony* places it in the input cell of the Definition range, on the row associated with that field. *Symphony* then uses the contents of that cell as the *selector_value* of the @VLOOKUP formulas to return the appropriate city or code. For example, the formula in cell E18 uses the contents of cell G18 as the *selector_value*, looks in the first column of *codes* for a match, and when it finds the match, returns the data that is *offset_number* of columns to the right. If you enter *c* in *Location*, *Symphony* replaces it with New York.

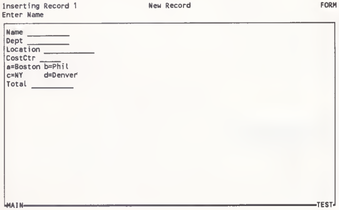
Cynthia G Fitzgerald
LOTUS *staff*

1-2-3/SYMPHONY

GOTO WITH TITLES

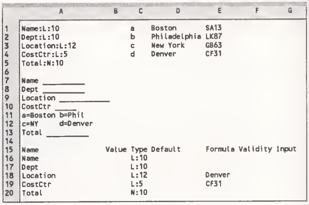
When I use both vertical and horizontal titles, I sometimes need to change the contents of a cell that is in the title area. It's inconvenient to select /Worksheet Titles Clear (in *Symphony*, MENU Settings Titles Clear Quit), make the change, position the cell pointer one row below and one column to the right of the rows and columns you want to freeze, and select /Worksheet Titles Both (in *Symphony*, MENU Settings Titles Both Quit) to reset the titles.

A simpler technique is to press GOTO (F5 on most computers) and enter the cell address. *1-2-3* and *Symphony* display a second copy of the title rows and columns and allow you to place the cell pointer on the cell that you want to



```
Inserting Record 1                 New Record                   FORM
Enter Name

Name __________
Dept __________
Location ____________
CostCtr _____
a=Boston b=Phil
c=NY     d=Denver
Total __________

MAIN                                                            TEST
```

FIGURE 1



```
             A              B   C     D           E        F        G
 1  Name:L:10                   a    Boston      SA13
 2  Dept:L:10                   b    Philadelphia LK87
 3  Location:L:12               c    New York    GB63
 4  CostCtr:L:5                 d    Denver      CF31
 5  Total:N:10
 6
 7  Name __________
 8  Dept __________
 9  Location ____________
10  CostCtr _____
11  a=Boston b=Phil
12  c=NY     d=Denver
13  Total __________
14
15  Name                  Value Type Default     Formula Validity Input
16  Name                        L:10
17  Dept                        L:10
18  Location                    L:12             Denver
19  CostCtr                     L:5              CF31
20  Total                       N:10
```

FIGURE 2

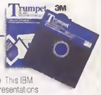
Impress the critics with your next film.

3M film looks best on 3M overhead projectors.

To make a strong impression, you need to combine the right information with the right presentation tools. That includes the best overhead transparency film you can buy — 3M computer-generated transparency film.

At first glance, most transparency film appears the same. But when projected onto a large screen, 3M film really stands out. Colors are vibrant and true. Characters are sharp and defined. So your polished presentation doesn't lose its shine.

Whatever type of plotter or printer you use, rely on 3M film for feeding reliability and a clearer image. 3M transparency films, projectors and accessories are available at your local 3M AV dealer or stationery store. Or call us for the name of your local source at **1-800-328-1371.** In Canada 1-800-268-9696.



FREE Graphics Software

Return this coupon for our Trumpet™ introductory software package. This IBM compatible package lets you design basic graphics for overhead presentations. **Indicate disk size:** ☐ **3½"** ☐ **5¼"** Offer good in U.S. and Canada only. LT290

Name ______________________________
Title ______________________________
Company ______________________________
Address ______________________________
City ______________ State ______________ Zip ______________
Telephone (________) ______________________________

Free sample requests must be made with this coupon. No phone calls, please. Mail to 3M Visual Systems Division, P.O. Box 33050, 3M Center, St. Paul, MN 55133-3050

The tools to take charge.

© 1990 3M

3M

change. After you make the change, press PageDown, PageUp, BIGRIGHT, and then BIGLEFT to clear the second copy of the titles. The titles will still be activated.

D. A. Van Becelaere
Vickers Inc.
Troy, Mich

PASSWORD NOT EXTRACTED

When you use the File Xtract command on a password-protected file, the file that you create isn't password protected. I discovered this when I performed a File Xtract procedure on a password-protected file and then found I could retrieve the extracted file without entering its password.

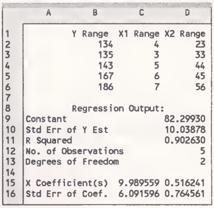
To password-protect a file that you extract, press slash (in *Symphony*, SERVICES), select File Xtract, and choose Formulas or Values. Type a new file name, press Spacebar once, type the letter *p*, and then press Return. You'll have to enter the password twice to verify it. The password won't display on the screen. Instead, a symbol will appear for every character you type. Finally, specify the range to extract.

Passwords can be up to 15 characters long, and they are case sensitive. Make sure you remember your password. If you forget it, you won't be able to retrieve the file.

John Haddad
Product Support Department
Lotus Development Corp.

STANDARD ERROR OF THE CONSTANT

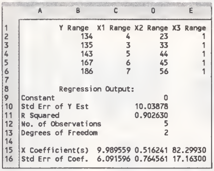
In my work as an economic research assistant, I was often frustrated because the Data Regression command was not capable of computing the standard error of the constant.



```
          A          B          C          D

1                 Y Range  X1 Range X2 Range
2                     134         4       23
3                     135         3       33
4                     143         5       44
5                     167         6       45
6                     186         7       56
7
8                 Regression Output:
9   Constant                        82.29930
10  Std Err of Y Est                10.03878
11  R Squared                       0.902630
12  No. of Observations                    5
13  Degrees of Freedom                     2
14
15  X Coefficient(s)  9.989559 0.516241
16  Std Err of Coef.  6.091596 0.764561
```

My associates and I have discovered a method for getting around this problem. Add another column to the X range (cells E1..E6 in the following figure). To get the results in the figure, enter the value *1* in each row of this column that has a corresponding entry in the other columns (range E2..E6). Then select /Data Regression X-Range, specify range C2..E6, select Y-Range, and specify B2..B6. Select Output-Range and specify cell A8. Select Intercept Zero to set the regression's intercept to zero.

When you select Go, the spreadsheet will calculate regression with the dummy X variable equal to the constant, which now appears in cell E15 (in the first figure the constant appears in cell D9). The standard error of the constant is displayed in cell E16.



```
          A          B          C          D          E

1                 Y Range  X1 Range X2 Range X3 Range
2                     134         4       23        1
3                     135         3       33        1
4                     143         5       44        1
5                     167         6       45        1
6                     186         7       56        1
7
8                 Regression Output:
9   Constant                               0
10  Std Err of Y Est                10.03878
11  R Squared                       0.902630
12  No. of Observations                    5
13  Degrees of Freedom                     2
14
15  X Coefficient(s)  9.989559 0.516241 82.29930
16  Std Err of Coef.  6.091596 0.764561 17.16300
```

Alon Granot
Kiriat Bialik
Israel

Symphony *users need to attach STAT.APP before attempting regression analysis. To do so, select SERVICES Application Attach, indicate STAT.APP, and select Quit. Then, in a SHEET window, select MENU Range Regres to set the regression ranges described above and perform the regression.*

1-2-3

USE NAMED RANGES WITH FILE XTRACT

1-2-3 Release 2.01 users should be aware of an unusual quirk when combining unnamed ranges from previously extracted files. For example, suppose you extract range D5..D15 from your worksheet file into a file named TEMP. If you retrieve TEMP, you will see the contents of cells D5..D15 in cells A1..A11, as you would expect. But if you erase the worksheet, then select /File Combine Copy Named/Specified-Range, specify range A1..A11, and specify TEMP as the file to combine, your data will not appear.

To resolve this problem, retrieve TEMP and then save it. Then subsequent File Combine commands will recognize range A1..A11 as the actual address of the extracted data in TEMP.

Jean-Claude Walther
Ste Anne de Bellevue, Quebec

Another option would be to assign a range name to the range to be extracted (in this case, range D5..D15 in the original worksheet) before performing the File Xtract command. This range name will be extracted to TEMP and will be recognized by subsequent File Combine commands.

The File Xtract command doesn't place an end-of-file mark in the extracted file. Retrieving and saving the extracted file adds the needed end-of-file mark.

HIDDEN COLUMNS IN PRINT RANGE

If you're using *1-2-3* Release 2.01 or 2.2 and your printer feeds a blank page after printing a worksheet, check for a named range that contains a hidden column. The Worksheet Column Hide command lets you hide columns in a worksheet. Hidden columns within a Print range do not appear in the printout. The printer feeds a blank page if you specify as the Print range the name of a range that has its rightmost column hidden.

To solve the problem, specify the cell addresses of the range you want printed. Make sure that you don't include the hidden column. Another option is to reassign the range name so that its rightmost column is not hidden.

John S Chmaj
Product Support Department
Lotus Development Corp

FINDERS KEEPERS USING F7

I frequently use the Data Query Find command to locate specific records in my database. After pressing the Escape key to end the search, I was frustrated by the fact that the cell pointer did not remain on the row containing the desired record. The cell pointer would return to the cell it was in when I selected Find. I've found that pressing the QUERY key (F7 on most computers), instead of Escape or Return, to end the search returns *1-2-3* to Ready mode, and the cell pointer remains in the first cell of the record I want.

Patrick Donnelly
RLI Corp.
Peoria, Ill

DIF TO WK1 TRANSLATION TRUNCATES NUMBERS

If you use *1-2-3's* Translate utility to translate nonstandard DIF files to WK1 files, you might encounter a problem when you retrieve the file in *1-2-3*. Every number that is 1,000 or greater will be truncated to a one-digit integer. This does not occur to numbers that have fewer than four digits to the left of the decimal place. For example, the number 350.25 translates correctly. The number 3,050.25 truncates to 3.

Exit from *1-2-3* and use the DOS TYPE command to look at the original DIF file. A nonstandard DIF file uses commas to delimit any numbers that are in the thousands.

Use a text editor to remove the commas that delimit numbers in the thousands and translate the DIF file again. All of the numbers in the worksheet will be correct.

Marjorie Benditt
Product Support Department
Lotus Development Corp

HARDWARE

TOSHIBA 341-SL AND 321-SLC SERIAL PROTOCOL

When you try to print by using *1-2-3* Release 2.2 along with either a Toshiba 341-SL or a Toshiba 321-SLC, you may get extraneous characters in the middle of the text or graph. After some research I found out that the printer's default serial protocol was XON/XOFF. Use the printer's Configure menu to change the protocol to RDY/BSY to solve the problem.

Ann Marcus
Product Support Department
Lotus Development Corp

EPSON LQ-1050 MINI PRINT

In *1-2-3* Release 3, the Epson LQ-1050 printer will produce print smaller than the usual compressed print if you select /Print Printer Options Setup and enter the setup string *\015* and then select compressed print by selecting /Print Printer Options Advanced Layout Pitch Compressed.

Marjorie Benditt
Laurie Levine
Product Support Department
Lotus Development Corp.

REVISITED

RETAINING NUMERIC FORMATS IN PRINT FILE

I have an easier way of retaining *1-2-3*'s numeric formats for my *WordPerfect* documents than suggested in the September 1989 issue, page 100. Instead of translating the spreadsheet into the DIF format and reconverting the DIF file into *WordPerfect* format, I create a print file in *1-2-3*. I exit *1-2-3*, then I load *WordPerfect*. From a blank document I use *WordPerfect*'s List Files function, change to my *1-2-3* directory, highlight the PRN file that I created in *1-2-3*, and retrieve it into my document. With this method all range formats from the worksheet are retained, and I can manipulate the data in any way necessary.

Joseph J Martella II
American Express
Travel Related Services
New York, N.Y.

USE RANGE INPUT TO FIND FORMULA CELLS

In the July 1989 issue, page 127, Donald A. Jones suggested using the Range Unprotect (in *Symphony*, Range Protect Allow-Changes) command to change the display of cells that contain formulas. This allows you to easily locate those cells. You can find specific cells even more quickly if you also use the Range Input command. This command lets you specify a range where cell-pointer movement is limited to unprotected cells.

First use the Range Unprotect command to unprotect the cells into which you'll enter or edit formulas. Then press the Home key, select /Range Input, and press the End key followed by the Home key to specify the active area of the worksheet as the data-input range. You can specify a different range by entering the range address. As soon as you press Return, the cell pointer moves to the first unprotected cell of the range.

If you use *Symphony*, you must attach the Input add-in. Select SERVICES Application Attach, select INPUT.APP, and then select Quit. Next use the Range Protect Allow-Changes command to unprotect cells into which you'll enter or edit formulas. Then, in a SHEET window, press the Home key, select MENU Range Input, and either enter a range address or press the End key followed by the Home key in order to specify the active area of the worksheet.

Use the Arrow keys, the Home key, or the End key to move among the unprotected cells. You can make an entry or edit the data in an unprotected cell. To end the Range Input command, press Escape or press Return without making an entry.

Nicki White
Knoxville, Tenn

COPY SAME SOURCE SEVERAL TIMES

I have a nonmacro alternative to Terrence W. Reigel's idea (October 1989, page 82) for copying the same source several times.

First, copy the source data to cell A1. Then, when you need to copy it, position the cell pointer on the destination cell and select /Copy. Press Escape, press Home, and press Return twice.

The Copy command begins the copy. Escape unanchors the cell pointer and places *1-2-3* in Point mode. Pressing Home and then Return moves the cell pointer to cell A1 and specifies cell A1 as the range to copy from. The cell pointer returns to its original location, the destination cell, and the final Return specifies that cell as the range to copy to.

Charles R Pegler, CPA
South Hauppauge, N.Y

This material was prepared by the Technical Editors, with the help of the Lotus Product Support staff.

WRITE US

Do you have a favorite technique or way of using your Lotus products or of keeping your hardware and software on speaking terms? Share it! We'll send you $50 if we print your letter. Send them to. Good Ideas, LOTUS *Magazine, P.O. Box 9123, Cambridge, MA 02139–9123.*

4 BUDGET ASSISTANTS

The Budget Express, *Budget Solutions*, *@Ease*, and *Master Planner*

BY TOM CARLTON AND R. MARTIN TEMPLE

Do you develop and analyze budgets in a *1-2-3* worksheet? If so, you've probably wished for an easier way to do one or more of the following:

- Lay out your budget worksheet
- Extract or display data based on a specific date or line-item category
- Consolidate regional or departmental budgets into one master budget worksheet
- Compare planned data to actual data
- Adjust your numbers to meet changing goals

The Budget Express, *Budget Solutions*, *@Ease*, and *Master Planner* are all *1-2-3* add-ins designed to make one or more of these tasks easier.

If you're looking for an all-in-one solution, try *The Budget Express* ($149). It lets you arrange your budget in outline form, which you can collapse or expand to show the level of detail you want. The program also makes it easy to consolidate budgets, to compare budget data, and to do manual what-if testing of your budget.

The other three programs are more specialized. If your goal-seeking needs go beyond the capabilities of manual what-if testing, consider *Budget Solutions* ($295 as part of *Business Planner*). In seconds this program repeatedly changes and recalculates hundreds of variables in your budget worksheet until it reaches the goal you specify. If you're looking for a few handy and inexpensive shortcuts for designing and printing your budget worksheets, *@Ease* ($99.95) is an excellent choice. And if you've never built a budget worksheet before, *Master Planner* ($495) holds your hand through the entire process.

ILLUSTRATIONS BY CHRISTIAN POTTER DRURY

THE BUDGET EXPRESS

The Budget Express arranges the rows, or line items, of your budget into a hierarchical outline (figure 1). Because the structure of an outline forces better organization, you're more likely to build a complete, accurate budget the first time around. Once you complete the budget, that structure makes it easier to analyze your data.

With a single command, *The Budget Express* creates a row of totals for any level of your budget outline. This command provides two benefits. First, it's faster and easier than copying *1-2-3*'s @SUM function across a row of your budget. Second, because the command sums only the data contained at a specified level of the outline, it doesn't add the same data twice—that is, it doesn't sum subtotals and the data that makes up those subtotals. To avoid that mistake when using @SUM, you have to skip subtotal lines and enter several different ranges as arguments for the @function.

Once you create the outline, you can collapse it—that is, eliminate all the data at a certain level of your outline (figure 2). This makes it easy to create a summary of your budget or to hide details that you don't want others to see. If you really want to conceal sections of detail, you can move those sections to a separate file on disk. You can even protect the file with a password, if you like. Moving sections of your budget to disk is also a great way to free up more memory when your budget worksheet starts to grow larger.

The Budget Express also makes it easier to set up and manage the dated columns of your budget. After you enter a date as the heading of your first monthly column, you can enter each successive month by pressing the RightArrow key. You can manipulate these the same way you manipulate rows. With single commands you can insert quarterly and yearly total columns, hide monthly rows to display only quarterly summaries, and move rows to disk.

Once you've set up your budget as described, *The Budget Express* can quickly make month-to-month, month-to-quarter, month-to-year, or year-to-date comparisons. These comparisons help you monitor your logic as you build your budget and spot trends as you enter your actuals.

The program also lets you consolidate data from other budget worksheets into your own budget worksheet. If the worksheets are laid out similarly, you can consolidate data by row label, month-name column heading, or row number. If not, you can consolidate by cell address. Another command consolidates and compares two columns at the same time. The resulting consolidation includes both of the columns and a third column showing the variance between the two. This feature makes quick work of budget-to-actual comparisons. Once you specify a comparison, you can save it and invoke it by name when you want to make the same comparison again. That saves you from repeating steps every month.

The Budget Express also smooths some of the bumps of goal seeking. You select a cell you want to change and specify the

---

Tom Carlton, a manager of corporate business analysis, and R. Martin Temple, a PC decision-support consultant, work at a midwestern Fortune 500 company.

CIRCLE 106 ON READER SERVICE CARD →

You're on a crash course. Let Verbatim back you up.

Even faster than your data has been stored, it can disappear. Wiping out invaluable time, effort and dollars. That's why you need to back up your data with Verbatim.®

Verbatim offers a line of products unique in safeguarding data. Like its exclusive DuPont Teflon® coating. And DataHold™ anti-static liners. Plus, a technologically advanced manufacturing process that assures every diskette is perfect.

Verbatim was also first to offer factory formatting to save you time. And lifetime warranties on every product. There are even color diskettes for easy organizing. Continuing Verbatim's history of providing new products with distinct user benefits.

So stay on course. Let Verbatim back up all your data. For more data on Verbatim, call 1-800-538-8589.

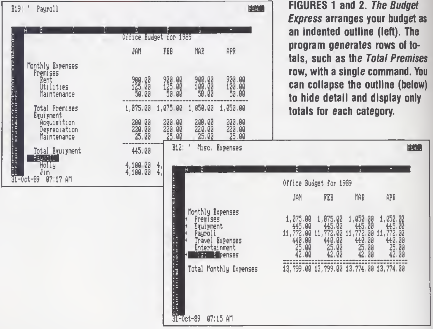
®Teflon is a DuPont registered trademark.

Verbatim
A **Kodak** Company

Doing More For The Data Process

change in terms of a percentage of its current value or a specific number. At the bottom of your screen, the program displays the actual value of the cell, the goal you're shooting for, and the difference between the two. As you change the value of other cells in the worksheet, the data at the bottom of the screen reflects those changes. This is especially helpful when you're goal seeking with a large worksheet.

One bit of advice: When you begin to use *The Budget Express*, it may help to tear out the menu-tree map from the program's manual and post it where you can refer to it easily. This program has lots of options, and until you're familiar with it, you'll have trouble finding the command you need.



```
B19: '  Payroll

                         Office Budget for 1989

                            JAN      FEB      MAR      APR

Monthly Expenses
  Premises
    Rent                   900.00   900.00   900.00   900.00
    Utilities              125.00   125.00   100.00   100.00
    Maintenance             50.00    50.00    50.00    50.00
                          ------------------------------------
  Total Premises         1,075.00 1,075.00 1,050.00 1,050.00
  Equipment
    Acquisition            200.00   200.00   200.00   200.00
    Depreciation           220.00   220.00   220.00   220.00
    Maintenance             25.00    25.00    25.00    25.00
                          ---------
  Total Equipment          445.00
  Payroll
    Holly                4,100.00 4,
    Jim                  4,100.00 4,
31-Oct-89  07:17 AM
```

```
B12: '  Misc. Expenses

                         Office Budget for 1989

                            JAN      FEB      MAR      APR

Monthly Expenses
+  Premises              1,075.00 1,075.00 1,050.00 1,050.00
+  Equipment               445.00   445.00   445.00   445.00
+  Payroll              11,772.00 11,772.00 11,772.00 11,772.00
+  Travel Expenses         440.00   440.00   440.00   440.00
   Entertainment            25.00    25.00    25.00    25.00
+  Misc. Expenses           42.00    42.00    42.00    42.00
                          ====================================
Total Monthly Expenses  13,799.00 13,799.00 13,774.00 13,774.00

31-Oct-89  07:15 AM
```

FIGURES 1 and 2. *The Budget Express* arranges your budget as an indented outline (left). The program generates rows of totals, such as the *Total Premises* row, with a single command. You can collapse the outline (below) to hide detail and display only totals for *each* category.

BUDGET SOLUTIONS

Suppose your boss returns your proposed budget with an attached note reading: "Cut marketing expenses by 15%—but don't cut advertising at all, and don't cut salaries by more than 5%." Unless you can meet the goal by deleting an unnecessary line item, the optimal solution is to make the smallest possible change to salary expenses and to try to distribute the rest of the reduction equally over the marketing budget. That's painstaking work, even with the assistance of *The Budget Express*.

Budget Solutions can make quick work of this problem. This add-in presents you with a pop-up form into which you enter: the goal cell—in this case the cell containing the total marketing expenses; the amount or percentage by which you want to change the goal cell—in this case, −15%; up to 500 variables—in this case, any cell that contributes to the total marketing expense; and constraints, or maximum allowable changes, to particular variables—in this case, a constraint of −5% for the cell containing total salary, and 0% for the cell containing total advertising.

Then you press a function key, and *Budget Solutions* calculates the new values required to generate the desired result—instantly, in most cases. When the program finishes calculating, you can see those changes in the form. If you're satisfied with the changes, you can enter them into your budget worksheet by pressing another function key.

Budget Solutions saves you lots of work. Although you only see the final result of its calculations, the program may perform hundreds or even thousands of what-if tests to get that result. It repeatedly changes the value of each input cell by the same fraction until it reaches the desired value for the goal cell or the constraint specified for each input cell, whichever comes first. If the latter comes first, the program correctly declares the problem unsolvable.

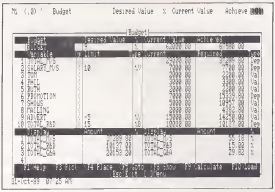
As hard and fast as it works, the program still has some notable limitations. You can only specify one goal cell. That could frustrate you if you wanted to seek goals for every monthly total in your budget. You have to seek each monthly goal separately or constrain each monthly total to the desired value and then seek the appropriate yearly total.

You can specify any variable as a range of cells, which can really save time if you need to specify lots of variables. A variable specified as a range, no matter how large, still counts as one variable. However, when *Budget Solutions* finishes its work, it does not display changes to variables specified as ranges. To see those changes, you have to enter all the results into the worksheet. If you didn't save your worksheet before goal seeking, you have no easy way of returning to your original display.

Budget Solutions is available only as part of *Business Planner* ($295), a decision-support package that contains other add-ins that do linear optimization, forecasting, risk analysis, and scenario analysis. If you experiment with your budget a lot, you'll probably find that *Budget Solutions* alone is worth the price of *Business Planner* or that *Business Planner*'s other programs are relevant to your work.

@EASE

Of the four products reviewed, *@Ease* is the most inexpensive, memory-efficient way to create budget worksheets quickly.



```
M1  (,0) '   Budget                Desired Value  %  Current Value   Achieve

                                   |Budget|
   Budget             Desired Value    %  Current Value      Achieved
   BUDGET             9                %        62000.00        67580.00
   Variable        Op Limit          Type Current            Required       Type
 1 TOTAL_M/S                                    29000.00        37289.80   Dep
 2 SALARY_M/S      <  10             %V          7000.00         7700.00   Dep
 3 TOM             <                             2000.00         2200.00   Val
 4 PHIL            <                             3000.00         3300.00   Val
 5 RUTH            <                             2000.00         2200.00   Val
 6 PROMOTION       <                             7000.00        15339.80   Dep
 7 SHOWS           <                             5000.00        10957.00   Val
 8 MAILING         <                             2000.00         4382.80   Val
 9 ADVERT          <  -5             %V         15000.00        14250.00   Val
10 TOTAL_R&D          15             %B         10000.00        10137.00   Dep
   Display            Amount           %  Display            Amount          %
 1 TOTAL_M/S               37289.80       TOTAL_M/S                  55.18   %
 2 TOTAL_R&D               10137.00       TOTAL_R&D                  15.00   %
 3 TOTAL_G&A               20153.20       TOTAL_G&A                  29.82   %
 4
  F1 Help   F3 Pick   F4 Place   F5 Goto   F6 Show   F9 Calculate   F10 Load
                           Esc Exit  [ ]Menu
31-Oct-89  07 25 AM
```

FIGURE 3: *Budget Solutions*'s pop-up form displays its results before entering them into your worksheet. Here the program has raised the total budget amount 9% without raising R&D expenses more than 15%, without raising total salaries more than 10%, and without cutting total advertising more than 5%. In this case the less-than sign (<) means less-than or equal-to.

The program is a collection of add-in @functions that eliminate some of the drudgery of laying out and printing a budget worksheet.

@Ease lets you create weekly, monthly, quarterly, or yearly column headings simply by copying the appropriate @function across a row of your worksheet. The program includes a grand-total @function and a subtotal @function that work together to save you time and trouble. For a specified range, the grand-total @function sums all the items in a column, excluding the subtotal @functions. Also included is an @function that sums numbers as they are displayed, which spares you the chore of using *1-2-3*'s @ROUND with every number in your budget.

Four more @functions let you extract data based on a specific date or range of dates from a table without setting up a Criterion range. This will save you lots of work if you regularly extract actual data from accounts payable or accounts receivable tables for comparison with your budget.

When it's time to print your budget, *@Ease* will help you get it right the first time. You can use one @function to center a title over a range of columns, another to tell you if a specified range fits on a printed page given the margins and printer-control sequence you set, and two more to tell you how many rows or columns you can fit on a page.

@Ease's sole drawback is its documentation. Although most of the users we spoke to had figured out how to use the @functions, several wished that the manual provided more-thorough instruction and more working examples.

MASTER PLANNER

If you've never created a budget worksheet before, *Master Planner* can teach you how. *Master Planner* was designed by a firm that provides financial-management training, as well as software. Its macro-driven worksheets prompt you to enter your budget data into component budgets for your sales, personnel, inventory, and fixed assets, and to consolidate those component budgets into a master budget.

All four components impose a structure on your budgeting, but each accommodates the line items you need for a small company or for a division of a larger company. The sales budget allows you to categorize products by two criteria, that is, by division and product, by product and geographical region, and so on. In the inventory budget, you can include unit and dollar amounts for finished goods, raw material, and work in process, as well as dollar amounts for goods not planned by unit. The fixed-asset budget includes space for depreciable and nondepreciable assets. The personnel budget lets you categorize employees by business unit and grade level, and you can include salary, benefits, and taxes in your payroll calculations.

Each component worksheet calculates subtotals and totals after you enter your information. Once you finish entering data into the components, *Master Planner*'s menus guide you to import the totals from each component worksheet into the master budget worksheet. However, they leave you to write the formulas that link the component totals to calculate the master totals. This isn't difficult, but it's inconsistent, as all the other formulas you need are already provided in the worksheets.

Although helpful, *Master Planner*'s autoexecuting macros can hamper you in one significant way. If while using any worksheet you enter an incorrect number at a prompt, you have to finish filling out the worksheet before you can go back and correct that number. And if you need help beyond that provided by the menus and the program's excellent documentation, beware—after providing 30 days of free technical support from the date of purchase, *Master Planner*'s publisher charges $60 per hour for technical support. That's a lot to pay for support given the program's price of $495. ■

IN BRIEF

@Ease Version 1.0. Spreadsheet Solutions, 600 Old Country Rd., Garden City, NY 11530; 516-222-1429. Runs on IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, *1-2-3* Releases 2/2.01, 2.2, or 3 or any version of *Symphony*, and 24K of RAM above that required for *1-2-3* or *Symphony*. Released 5/89. $99.95. 30-day, money-back guarantee; 90-day warranty against defective disk.

Budget Solutions Version 3.0, sold as part of *Business Planner*. Enfin Software Corp., 6920 Miramar Rd., Suite 106-A, San Diego, CA 92121; 619-549-6606. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, 320K of RAM, and *1-2-3* Releases 2/2.01 or 2.2 or any version of *Symphony*. Released 6/88. $295. 30-day, money-back guarantee.

Master Planner Version 2.0. Management Advisory Services, 2401 Fourth Ave., Seattle, WA 98121-1436; 800-325-4322. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, *1-2-3* Release 2.01, and 256K of RAM above that needed for *1-2-3*. Released 5/89. $495. 30-day, money-back guarantee. Technical support free for 30 days; $60 per hour thereafter.

The Budget Express Version 1.0. Symantec Corp., 10201 Torre Ave., Cupertino, CA 95014; 408-253-9600. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, *1-2-3* Releases 2/2.01 or 2.2, and 64K RAM above that required for *1-2-3*. Supports Lotus/Intel/Microsoft Expanded Memory Specification 3.2 or higher. Released 5/89. $149. 30-day, money-back guarantee.

ADVERTISER INDEX

Reader Service Number	Advertiser	Page
—	3M Data Storage Products Division	52–53
—	3M Visual Systems Division	73
—	Ashton-Tate	91
—	AT&T	Cover 4
107	Best Programs	83
—	Dow Jones & Company Inc.	27
103	HavenTree Software Limited	13
102	Intex Solutions Inc.	9
—	Jesse Jones Industries	31
—	Lotus Development Corporation	Cover 2
108	Output Technology Corporation	85
105	Pacific Data Products Inc.	62
111	PC Publishing	Cover 3
—	Plus Development Corporation	22–23
110	Primavera Systems Inc.	89
109	Quarterdeck Office Systems	87
—	Software Publishing Corporation	61
104	Sony Corporation of America	19
101	Toshiba America Inc.	4–5
106	Verbatim	77
	QUICK ADS	
112	Business Forecast Systems	95
113	Computer Search USA	95
114	Lerman Associates	95
115	PLAN Systems International	95

ADVERTISING REPRESENTATIVES

NEW ENGLAND
Robert P. Pavone
Associate Publisher/Sales Director
Lotus Publishing Corporation
P.O. Box 9123
Cambridge, MA 02139-9123
(617) 494-1192

MID-ATLANTIC/SOUTHEAST
Richard K. Felt
D. Douglas Johnson
Felt, Johnson & Associates
P.O. Box 199
Devon, PA 19333-0199
Felt (215) 688-9342
Johnson (215) 935-8522

MIDWEST
Joseph P. Gleason
The Grail Company
512 W. Burlington
LaGrange, IL 60525
(708) 352-4090

SOUTHWEST/SOUTH PACIFIC
Arleigh Hupp
Hupp/Co-Media
359 San Miguel Drive, Suite 203A
Newport Beach, CA 92660
(714) 720-0222

NORTH PACIFIC
Don Farris
Don Farris Company Inc.
P.O. Box 936
2555 Flores, Suite 200
San Mateo, CA 94403
(415) 349-2222

EDITORIAL EVALUATION

Your comments about *LOTUS* magazine help us bring you the best editorial product each month. To rate the articles in this issue, scan the list below and refer to the Editorial Evaluation section of the Reader Service card to the right. Identify the number corresponding to each article, then mark the box on the card that reflects your rating.

NO.	TITLE	PAGE
1	STAFF LETTER	2
2	IDEAS & TRENDS	6
3	@LOTUS	16
4	START HERE Enhanced Graphs	18
5	1-2-3 MACROS Alphabetical Disorder	24
6	FOR DEVELOPERS A Step Up for Power Users	28
7	MACRO BASICS Macros Can Make Decisions	32
8	FEATURE Here's the Missing Link	34
9	FEATURE Order Entry Made Simple	40
10	FEATURE Testing Choices in a Hurry	48
11	FEATURE Chart Your Process Flow	54
12	FEATURE How to Win with Financial Leverage	63
13	Q&A	68
14	GOOD IDEAS	72
15	REVIEW *The Budget Express, Budget Solutions, @Ease,* and *Master Planner*	76
16	REVIEW *Baler* 5.0	81
17	REVIEW *TaxTime, TaxEase,* and *Lotax*	86
18	NEW PRODUCTS	90
19	ESSAY Windows Has a Bright Future	96

LOTUS Reader Service

February 1990

This card expires 9/1/90

Name

Title

Company

Address

City State Zip

Phone

Comments

CIRCLE THE NUMBERS FOR FREE INFORMATION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105
106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147
148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189
190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210

EDITORIAL EVALUATION

Article No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1 Excellent	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2 Good	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3 Fair	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4 Poor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
5 N/A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

For Free Information To receive information about products and services advertised in this issue, please use one of these Reader Service cards. Just circle the numbers on the card that correspond to the Reader Service numbers on advertisements and new product announcements, and drop the postage-paid card in the mail.

* * * * * * * * * * * * * * * * *

You can use the same card to tell the editors of *LOTUS* how you feel about the articles you read in this issue:

1 Get the assigned number for each article from the Editorial Evaluation list on the facing page.

2 Use that number to locate the appropriate column of boxes on the card.

3 Note the key words at the left and put an x in the square that best reflects your reaction to that article.

* * * * * * * * * * * * * * * * *

To Subscribe to LOTUS Circle number 100. You will be billed $24 for a 12-issue subscription (U.S. only).

LOTUS Reader Service

February 1990

This card expires 9/1/90

Name

Title

Company

Address

City State Zip

Phone

Comments

CIRCLE THE NUMBERS FOR FREE INFORMATION

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42
43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105
106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126
127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147
148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168
169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189
190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210

EDITORIAL EVALUATION

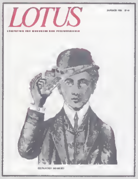
Article No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
1 Excellent ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
2 Good ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
3 Fair ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
4 Poor ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
5 N/A ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 746 PITTSFIELD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

LOTUS
Reader Service Department
P.O. Box 5140
Pittsfield, MA 01203-9860



SUBSCRIBE AND SAVE!

Use these cards to subscribe to ***LOTUS*** at 33% off the annual newsstand rate! To order, circle number 100 on the attached Reader Service card. We'll start your one-year (12-issue) subscription and bill you just $24.

The annual single copy rate is $36. Please allow 4-6 weeks for delivery of your first issue.
This offer is available only in the U.S.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 746 PITTSFIELD, MA

POSTAGE WILL BE PAID BY ADDRESSEE

LOTUS
Reader Service Department
P.O. Box 5140
Pittsfield, MA 01203-9860

A NEW LEADER AMONG 1-2-3 COMPILERS

The improved *Baler* 5.0 lets you create stand-alone programs from almost any *1-2-3* worksheet.

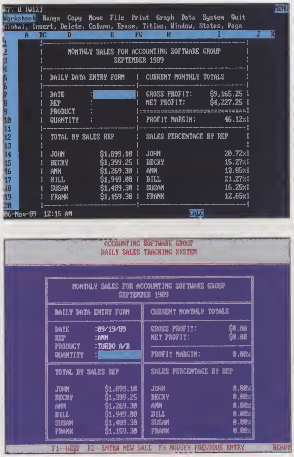
BY BILL LAWRENCE

Past reviews have thoroughly covered the benefits and drawbacks of worksheet compilers for *1-2-3*. The chief benefit: By compiling *1-2-3* worksheets into stand-alone applications, you can save users the expense and trouble of buying and learning *1-2-3*. The chief drawback: Each of the compilers that we've reviewed fails to allow you to incorporate some significant portions of *1-2-3*'s functionality into your stand-alone applications.

Baler 5.0 ($495) almost completely eliminates this trade-off. You can use *Baler* 5.0 to create stand-alone applications that do just about anything you can do in a *1-2-3* Release 2/2.01 worksheet. In fact, it's easier to list what you can't do in an application created by using *Baler* 5.0: You can't insert columns; you can't enter, edit, or copy formulas; you can't print graphs (but you can create and display them); you can't use *1-2-3*'s Data Matrix or Data Regression commands; and you can't use add-in applications or @functions. You can do anything else.

This compiler also lets you customize your stand-alone applications to make them easier to use. You can add pull-down or pop-up menus, create context-sensitive help screens, and control the color of any portion of the screen display. If you're a skilled *1-2-3* macro programmer, you can use *Baler* 5.0 to create stand-alone applications that you'd otherwise have to create by using a programming language.

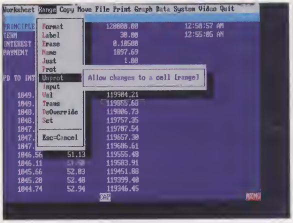
If you've used a previous version of *Baler*—or if our reviews of previous versions discouraged you from doing so—note that this latest release performs significantly better. *Baler* 5.0 can compile your largest worksheet and can do so



```
E7: U [W12]                                                          MENU
Worksheet  Range  Copy  Move  File  Print  Graph  Data  System  Quit
Global, Insert, Delete, Column, Erase, Titles, Window, Status, Page
      A  BC     D          E      FG      H              I          J  K
1        |--------------------------------------------------------|
2        |     MONTHLY SALES FOR ACCOUNTING SOFTWARE GROUP        |
3        |                  SEPTEMBER 1989                        |
4        |--------------------------------------------------------|
5        |  DAILY DATA ENTRY FORM    |  CURRENT MONTHLY TOTALS    |
6        |---------------------------|----------------------------|
7        |  DATE       :             |  GROSS PROFIT:   $9,165.25 |
8        |  REP        :             |  NET PROFIT:     $4,227.25 |
9        |  PRODUCT    :             |============================|
10       |  QUANTITY   :             |  PROFIT MARGIN:     46.12%|
11       |---------------------------|----------------------------|
12       |  TOTAL BY SALES REP       |  SALES PERCENTAGE BY REP   |
13       |                           |                            |
14       |  JOHN          $1,899.10  |  JOHN               20.72%|
15       |  BECKY         $1,399.25  |  BECKY              15.27%|
16       |  ANN           $1,269.30  |  ANN                13.85%|
17       |  BILL          $1,949.00  |  BILL               21.27%|
18       |  SUSAN         $1,489.30  |  SUSAN              16.25%|
19       |  FRANK         $1,159.30  |  FRANK              12.65%|
20       |---------------------------|----------------------------|
06-Nov-89  12:15 AM                              CALC
```

```
                  ACCOUNTING SOFTWARE GROUP
                 DAILY SALES TRACKING SYSTEM

        MONTHLY SALES FOR ACCOUNTING SOFTWARE GROUP
                       SEPTEMBER 1989

   DAILY DATA ENTRY FORM       CURRENT MONTHLY TOTALS

   DATE       :09/19/89        GROSS PROFIT:        $0.00
   REP        :ANN             NET PROFIT:          $0.00
   PRODUCT    :TURBO A/R
   QUANTITY   :                PROFIT MARGIN:       0.00%

   TOTAL BY SALES REP          SALES PERCENTAGE BY REP

   JOHN          $1,899.10     JOHN                 0.00%
   BECKY         $1,399.25     BECKY                0.00%
   ANN           $1,269.30     ANN                  0.00%
   BILL          $1,949.00     BILL                 0.00%
   SUSAN         $1,489.30     SUSAN                0.00%
   FRANK         $1,159.30     FRANK                0.00%

     F1--HELP  F2--ENTER NEW SALE  F3 MODIFY PREVIOUS ENTRY        READY
```

FIGURE 1. A sales-tracking application created in *1-2-3* (left) and compiled with *Baler* 5.0 (below). *Baler* 5.0 lets you eliminate *1-2-3*'s menus and borders, control colors, link your macros to function keys, and create context-sensitive help.



```
Worksheet Range Copy Move File Print Graph Data System Video Quit

PRINCIPLE  Format            120000.00          12:50:57 AM
TERM       Label                 30.00          12:55:05 AN
INTEREST   Erase               0.10500
PAYMENT    Name                1097.69
           Just                   1.00
           Prot
PD TO INT  Unprot    Allow changes to a cell [range]
           Input
  1049.    Val               119904.21
  1049.    Trans             119855.68
  1048.    DeOverride        119806.73
  1048.    Set               119757.35
  1047.                      119707.54
  1047.    Esc=Cancel        119657.30
  1047.                      119606.61
  1046.56        51.13       119555.48
  1046.11                    119503.91
  1045.66        52.03       119451.88
  1045.20        52.48       119399.40
  1044.74        52.94       119346.45
                       CAP                                  MENU
```

FIGURE 2. *Baler* 5.0 lets you convert *1-2-3*'s horizontal menus to pull-down menus, complete with explanatory text. Because pull-down menus leave previous menu choices on the screen, users can more easily learn and remember the sequences of commands they use most often.

Bill Lawrence is a network engineer based in southern California and author of Using Novell NetWare *(Que Corp.).*

much more quickly than previous versions did. In most cases, compiled worksheets and macros run faster than their *1-2-3* counterparts. And, if necessary, applications compiled by *Baler* can use expanded memory or your hard disk for extra memory.

You may find that a large worksheet—particularly one that contains mostly textual data—requires more memory after you compile it using *Baler* 5.0. If such a worksheet doesn't fit into conventional memory, it can use expanded memory or hard-disk space as extra memory. However, beware that a compiled worksheet that uses hard-disk space as extra memory will run much more slowly than one that uses RAM.

The version of *Baler* that we tested did not support the new features in *1-2-3* Release 2.2 or 3. A version of *Baler* for Release 2.2, which should be available when you read this, will support the Data commands mentioned earlier, as well as Release 2.2's minimal-recalculation and file-linking capabilities.

At this writing, *Baler* 5.0's chief competitor is *King Jaguar* ($595, Sheng Labs, Beaverton, Ore.). I did not receive a copy of *King Jaguar* in time to review it alongside *Baler* 5.0, but I was able to run it through some preliminary tests. *King Jaguar* did quite well in some tests, and especially so when compiling macro-driven worksheets. However, I did encounter some problems with the program (see box) and recommend that you wait until they are corrected before you purchase the program. *LOTUS* will report these corrections as soon as possible.

BALER 5.0 LETS YOU ADD PULL-DOWN MENUS, CONTEXT-SENSITIVE HELP, AND COLORS TO YOUR APPLICATION.

WHAT YOU GAIN

In addition to supporting most of *1-2-3*'s commands, *Baler* 5.0 returns to your compiled applications some of the conveniences that other compilers, including previous versions of *Baler*, took away. For example, *Baler* 5.0 lets you include @functions in your macros. Previous versions of the program required you to remove all @functions from any macros in a worksheet before you compiled the worksheet. You then had to place the @functions in another area of the worksheet and rewrite your macro to refer to them by cell address. *Baler* 5.0 eliminates these extra steps.

COMPILING ACCELERATES SOME WORKSHEETS AND SLOWS OTHERS*

30-Year Amortization Table: Uses @IF to display yearly subtotals	
1-2-3 Release 2.01	:41
1-2-3 Release 2.2 (minimal recalculation)	:51
Compiled by *Baler* 5.0	**:04**
Optimal-Recalculation Test: Change affects 10% of formulas	
1-2-3 Release 2.01	:28
1-2-3 Release 2.2 (minimal recalculation)	**:16**
Compiled by *Baler* 5.0	:24
@Function Test: 355K; contains almost every *1-2-3* @function	
1-2-3 Release 2.01	**:15**
1-2-3 Release 2.2 (minimal recalculation)	**:15**
Compiled by *Baler* 5.0 (using LIM-EMS expanded memory)	:31
Compiled by *Baler* 5.0 (using hard disk as memory)	:40
Macro Test: Recalculates several times and puts answers in new row	
1-2-3 Release 2.01	2:22
1-2-3 Release 2.2 (minimal recalculation)	**:24**
Compiled by *Baler* 5.0 (first recalculation)	1:58
Compiled by *Baler* 5.0 (subsequent recalculations)	:34

*All times shown in minutes and seconds. Tests performed on an 80286-based computer running at 10 MHz.

You can also insert rows into an application compiled by *Baler* 5.0—something you can't do in an application compiled by any other compiler we've reviewed. This means you can create stand-alone data-entry applications that weren't possible before. However, you can add rows only beneath the last row containing a formula. When you add data to a row that was empty before you compiled the worksheet, your next recalculation will be slow. However, subsequent recalculations will be much faster.

As mentioned before, you cannot enter or edit formulas in a worksheet compiled by *Baler* 5.0. However, when you type a formula into a cell of your compiled worksheet, the resultant value is entered into that cell. What that means is that you can still use formulas for one-time calculations.

Baler 5.0 is notable for the *1-2-3* functionality it retains, but you may be more impressed by the capabilities it adds. You can convert *1-2-3*'s horizontal menus to pull-down menus (see figure 2). You can also convert your macro menus and file listings to menu boxes that pop up on the screen.

You can include context-sensitive help screens in your compiled applications. Using a special command, you can write a macro that determines which section of help text is appropriate at any time. *Baler* stores your help files on disk. Thus, they don't use memory until a user requests help.

You can also select the color of any element on the screen. You can choose the foreground and background colors for protected cells, unprotected cells, the cell pointer, and menus. You can choose colors even for your borders and status messages. If you write applications for users who have EGA or VGA graphics adapters in their systems, you can give them the option of displaying 43 or 50 lines of text per screen, respectively.

Baler 5.0 also comes with a special program that lets you include lines, boxes, and shading in your applications. This program yields impressive effects, but it's difficult to install and use.

COMPILING

Baler 5.0 compiles your worksheets much more quickly than its predecessor, *Baler* 4.0. You simply enter a single command at the DOS prompt. *Baler* 5.0 com-

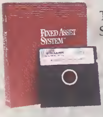
Behind These Successful Fixed Asset Managers…

Barbara Timmons, Fixed Assets Coordinator, PoFolks, Inc., Nashville, TN.

Hank Cohen, CPA, Cohen Pollack & Associates Chtd., Silver Spring, MD.

Jeffrey B. Levine, Assistant Vice President, Bank of Tokyo, Ltd., New York, NY.

…Stands the Best Fixed Asset System.



From the Bank of Tokyo to PoFolks of Tennessee, Best Programs' Fixed Asset System is the number one choice of smart asset managers. In fact, you don't have to look too far to find the Fixed Asset System standing behind thousands of successful accounting firms, including most of the Big Eight. And behind small to mid-size businesses like Calvin Klein and Colonial Williamsburg; large corporations like Chase Manhattan and Capital Cities; manufacturers such as General Electric and non-profit institutions like Mercy Hospital.

Compare the Fixed Asset System With Any Other

The Fixed Asset System handles AMT and Short Years plus it complies with all FASB 96 reporting requirements. It tracks up to 99,999 assets and maintains up to five different sets of books. It calculates depreciation according to 17 common or up to 36 customized methods. And, it provides information necessary for financial statements, general ledger posting and tax filing.

No Matter What Your Business, It's Easy To Use

Program flexibility allows you to sort and subtotal assets by whatever fields you want. Adjust the system to any fiscal year. And even customize up to 11 field names. Clearly written menus and screens make the data entry easy. In fact, you'll find you can do it all with just a few simple keystrokes.

And It's Yours To Try Free

Join thousands of the most successful asset managers and send for your no-risk, 30 day free trial today. See for yourself just how easy and flexible the Fixed Asset System can be in meeting your asset management needs. If you agree to keep it, you'll pay just $795. And if it doesn't stand up to everything you need, simply return it with no further obligation.

CIRCLE 107 ON READER SERVICE CARD

To order, simply return the coupon below or call toll-free

1-800-368-2405

☐ YES, Please send me the Fixed Asset System to try for 30 days. I understand that if I'm not completely satisfied, I may return the program and pay nothing.

☐ I'm interested. But first send me more information.

Name:__________

Company:__________

Address:__________

City:__________State______Zip__________

Phone:(_____)__________

(Runs on IBM PCs and compatibles with 640K memory)

BEST PROGRAMS
The Quality Software Company

2700 S. Quincy Street
Arlington, VA 22206
1-800-368-2405

CYIAA

piles small worksheets in seconds. It compiled a 360-row amortization worksheet in just under two minutes on an 80386-based computer running at 16 MHz—a big improvement over the four hours required by *Baler* 4.0 to do the same job on the same machine.

Unlike previous versions, *Baler* 5.0 can compile the largest worksheet you have. As needed during compiling, the program will first make use of any expanded memory you have and then, if necessary, will use free disk space as extra memory. However, if *Baler* 5.0 has to use free disk space to compile your worksheet, it will slow down noticeably. For example, it took the program 1 hour 20 minutes to compile a 1.1-megabyte worksheet on the same 80386-based computer mentioned above.

After you compile a worksheet, you must distribute it along with a run-time program that enables a user to run the compiled worksheet from DOS, without *1-2-3*. *Baler* 5.0 includes two run-time programs: one that supports all of the *1-2-3* functionality that *Baler* 5.0 supports and another that omits support for *1-2-3*'s Data and Graph commands. On a computer that has 640K of conventional memory, the former run-time program leaves about 248K of conventional memory for your compiled worksheet, and the latter leaves about 288K. These amounts are considerably less than the approximately 400K of conventional memory that *1-2-3* Release 2/2.01 leaves for your worksheets.

Depending on the contents of the worksheet you compile, either run-time program's memory requirement may hinder your users. A worksheet that contains mostly formulas will require much less memory after you compile it using *Baler*. For example, a 350K worksheet barely fit into the conventional memory left by *1-2-3*, but after being compiled, it easily fit into conventional memory along with *Baler* 5.0's larger run-time program. However, a worksheet that contains mostly text will not shrink much after being compiled. Such a worksheet, when paired up with either run-time program, will require more memory than its *1-2-3* counterpart.

A COMPILED WORKSHEET CAN USE EXPANDED MEMORY OR HARD-DISK SPACE AS ADDITIONAL MEMORY.

SPEED AND SAFETY

If it fits into conventional memory, a worksheet compiled by *Baler* 5.0 recalculates significantly faster than its *1-2-3* counterparts, and its macros execute more quickly. The sole exception to this rule is a worksheet that would benefit from *1-2-3*'s minimal recalculation.

If a compiled worksheet is too large to fit into conventional memory, it uses expanded memory and then hard-disk space as extra memory. A compiled worksheet that uses expanded memory runs slower than its *1-2-3* counterpart. But when a compiled worksheet uses hard-disk space as extra memory, it slows down dramatically. For example, sorting a compiled database that had 1,000 records took almost 11 minutes. Before this worksheet was compiled, the same sort process took 50 seconds in *1-2-3* Release 2.01.

Like all compilers, *Baler* 5.0 converts your original *1-2-3* formulas into programming code. After you've compiled your worksheet, the formulas are invisible, and users can't change them—accidentally or intentionally. That makes errors in calculation very unlikely.

Baler 5.0 lets you further safeguard against errors. You can specify which cells can be changed by keyboard input or by macro input and which cells can not be changed at all. Protecting your macros against change is an excellent way to ensure that they'll always work as planned. You can also disable any or all of *1-2-3*'s commands within your compiled worksheet, or you can make them accessible through your macros only. By setting these limitations, you can prevent users from accidentally selecting commands that could be confusing or cause damage. ■

KING JAGUAR: FUTURE PROMISE, PRESENT PROBLEMS

King Jaguar version 1.0 delivers good news and bad news. The good news is that of all the compilers *LOTUS* has reviewed, *King Jaguar* will probably create the fastest stand-alone applications from your macro-driven worksheets. The bad news is that it failed to compile successfully some of our test worksheets.

First, the good news. Unlike *Baler* 5.0, *King Jaguar* compiles macros into programming code. These compiled macros run fast. In my tests, a macro-driven worksheet that was compiled using *King Jaguar* ran six times faster than its *1-2-3* counterpart.

King Jaguar also includes a macro debugger that allows you to monitor results at any step of a macro-driven calculation. And if you can program in C or in assembly language, you can use those skills to add custom calculations or functionality to the applications that you compile using *King Jaguar*.

The bad news is that *King Jaguar* could not compile my amortization worksheet. My @function-test worksheet did not work after I compiled it. I couldn't load my 3,500-record database after I compiled it—even though my system had more than 1 megabyte of expanded memory available. In addition, a macro that contained *1-2-3*'s {TABLE} command did not work after I compiled it. *Baler* 5.0 had no trouble compiling all these worksheets successfully.

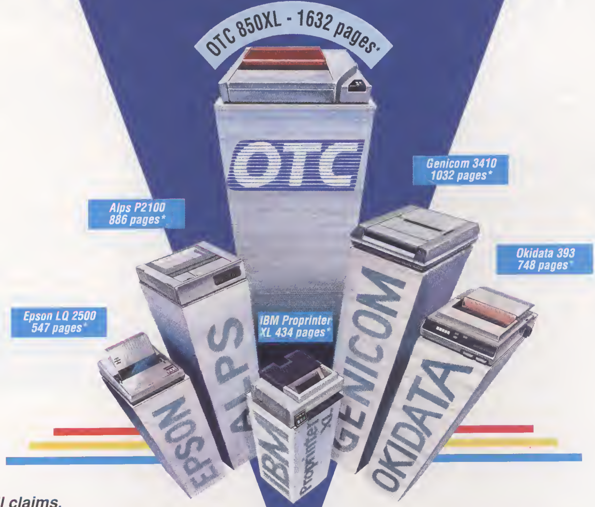
King Jaguar's publishers are working to correct these problems, and *LOTUS* will publish results of these corrections as soon as they are available. If you want to create macro-driven, stand-alone applications from *1-2-3* worksheets, you may want to wait for these results before you choose between *Baler* 5.0 and *King Jaguar*. —*B.L.*

IN BRIEF

Baler 5.0. Baler Software Corp., 1400 Hicks Rd., Rolling Meadows, IL 60195; 800-327-6108, outside the U.S. 708-490-5325. Runs on the IBM PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.1 or higher, 512K of RAM, and a hard disk with at least 1.8 megabytes of free space. Automatically supports a math coprocessor. Compiles worksheets created with *1-2-3* Release 2/2.01. Released 8/89. $495. 30-day, money-back guarantee.

SPREAD SHEETS FASTER!

OTC's 850XL Prints Spreadsheets Faster Than Its Competition! 240 LPM Guaranteed!



Tall claims.

Many companies say they offer the fastest printer with the best value for your money. At OTC, we challenged those claims . . . and won! Our tests prove we deliver more throughput for your money.

We took five competitive printers and ran a Lotus™ 1-2-3 spreadsheet under the exact same conditions. The OTC 850XL not only delivered 58% more throughput than its closest competitor, but also offered the best price/performance ratio.*

It's easy to make tall claims. But the others just don't stack up to Output Technology! ***Take a good look at who's standing tall above the rest . . . call OTC for a free copy of our Benchmark test today! Over 300 Service Centers Nationwide.*****

1-800-4-OUTPUT
(468-8788)
(8 am — 5 pm PST)

OTC
OUTPUT TECHNOLOGY CORPORATION

E. 9922 Montgomery Drive, Suite #6
Spokane, WA 99206-4199
(509) 926-3855 (800) 4-OUTPUT (468-8788)
Telex. #15-2269 OUTPUTSPOK FAX: (509) 922-4742

*Calculated for 8-hour day, based on actual 50-page print test. All printers run in 10 CPI, 6 LPI, 136 columns
**Call for availability in your area
IBM, Epson, Alps, Genicom, Okidata, and Lotus are trademarks of others and do not belong to OTC

CIRCLE 108 ON READER SERVICE CARD

3 PERSONAL INCOME TAX TEMPLATES FOR 1-2-3

TaxTime, TaxEase, and *Lotax*

BY CAROLINE HALLIDAY

Have you filed your income tax yet? If you haven't, and if you need to itemize on forms other than Form 1040, you might consider preparing your taxes with one of several tax templates for *1-2-3*. One of these inexpensive programs can very likely spare you the drudgery of reentering information, as well as prevent mathematical errors or misplaced data.

Three such templates are *TaxTime* 1040 Individual ($95), *TaxEase* Individual ($69 to $79), and *Lotax* Personal Template ($45). All three macro-driven templates help you fill in Form 1040, as well as the most commonly used additional forms and schedules. All three automatically enter data from the additional forms and schedules into your Form 1040. And all three can, with a single command, print the forms you need.

My review is based on the 1988 version of each template. At the time of this review, 1989 versions were not yet available. However, each publisher assured me that the 1989 version will differ only slightly from the 1988 version.

TaxTime is the easiest and most reassuring template of the three. It's relatively free of idiosyncrasies that might raise doubts about the accuracy of your return. It also does the most to make sure you fill out and print all the forms you need for your tax return.

If you're married and you and your spouse file only one Form W-2 each, you may prefer *TaxEase*. This template helps you determine whether you should file a joint return or separate returns. But *TaxEase* has one or two quirks that could slow you down or, worse, undermine your confidence in your return.

I found *Lotax* the least helpful. This template calculates your taxes accurately, but its forms are the hardest to follow, and it provides the least protection against errors.

TAXTIME

TaxTime's greatest competitive advantage is its ease of use. Unlike the other two templates, *TaxTime* requires you to remember only one Alt-key combination—the one that brings up the template's main macro menu, from which you can select any of the template's features.

Like any tax template, *TaxTime* is laid out so that it will print your data in the correct blanks on your tax forms. But what looks fine on a form can be confusing on the screen. To make sure that you enter your data in the correct cells, *TaxTime* uses cell protection to protect all cells except those into which you enter data. On a color monitor, the contents of these data-entry cells appear in a different color than the contents of the other cells. On a monochrome monitor, the contents of the data-entry cells appear more intense. The program goes one step further: It switches global protection on so that you can't enter data into the wrong cell by mistake.

THESE TAX TEMPLATES FOR 1-2-3 CAN PREVENT MATHEMATICAL ERRORS, MISPLACED DATA, AND THE DRUDGERY OF REENTERING INFORMATION.

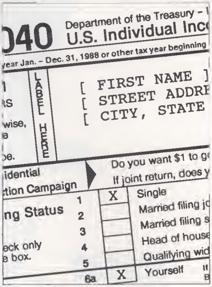

040 Department of the Treasury –
U.S. Individual Inc
year Jan. – Dec. 31, 1988 or other tax year beginning
LABEL HERE
[FIRST NAME]
[STREET ADDR
[CITY, STATE
Do you want $1 to g
If joint return, does y
idential
tion Campaign
ng Status
eck only
e box.
1 X Single
2 Married filing j
3 Married filing s
4 Head of house
5 Qualifying wid
6a X Yourself

FIGURE 1. This IRS-approved replica of Form 1040 was printed on a Hewlett-Packard laser printer using additional software available from *TaxTime*'s publisher.

TaxTime displays a screen that lets you know the forms you have and have not filled out, which makes it hard for you to forget a form. Like the other templates, *TaxTime* can automatically and with a single command print all the forms and schedules you filled out. You print your data directly into forms specially designed for your computer's printer, or you print the data on plain paper and then use a photocopier to copy the data onto standard IRS forms.

But only *TaxTime*'s publisher offers a way to print IRS-approved replicas of your Form 1040 and other forms, with or without your tax data, on a Hewlett-Packard laser printer. This is expensive: In addition to the cost of the template, you must purchase a file that contains the

Caroline Halliday is an electrical engineer with High Tech Aid, a Chicago-area consulting firm specializing in technical documentation and training.

Use the Brains IBM Gave You!

When the PC was new, big programs rarely used even 64K. So IBM® seemed quite generous when it gave us 640K of user memory.

That was eight years ago. Today, users are struggling to accommodate network and mouse drivers, TSRs and buffers within that same 640K along with the new generation of more powerful programs. It's known as 'RAM cram.'

If this is a problem you're facing (or expect to face) we have good news for you.

Introducing Manifest™—the Quarterdeck memory analyzer

Even expert PC users may be unaware how much of the capacity in most PCs is wasted.

That's why Quarterdeck Office Systems, publishers of DESQview,™ developed Manifest, a new, inexpensive tool to assess memory use. It's the result of years of in-depth study of the memory map of the PC. It does for memory what PC Tools does for disks. All for under $60.

Manifest shows you things you might not otherwise know about your PC.

Manifest gives you a guided tour 'under the hood' of your PC, to show what's going on, what type and amount of memory is available, and even which portions of RAM are faster.

Then it suggests how you might load networks, buffers, mouse drivers, TSRs and other utilities into unused memory.

It finds and displays all the contents of your AUTOEXEC .BAT and CONFIG.SYS FILES, which can be a big help in diagnosing problems.

Manifest even tests memory board speed so you can make informed buying decisions.

System Requirements

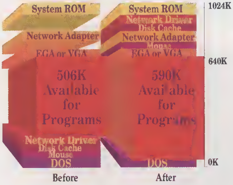
Manifest: 8088, 8086, 80286 80386 and i486 PCs & PS/2s

QRAM: 8088, 8086, 80286 PCs. Use of high memory is only available when PC has EMS 4 or EEMS expanded memory or Chips & Technologies shadow RAM.

QEMM 50/60: 80286-based PS/2s and compatibles with IBM PS/2 80286 Memory Expansion Option, IBM PS/2 80286 Expanded Memory Adapter/A or compatible.

QEMM-386: 80386-based PCs and PS/2s and PCs with 80386 add-in boards.

Trademarks. IBM, PS/2 IBM Corporation, PC Tools· Central Point Software, 80386, i486 Intel Corporation, Chips and Technologies Chips and Technologies



Your memory is full of holes. We can fill them. And give your programs more room to run smoothly.

Best of all, you don't need a PhD to understand what you're doing. Manifest's interactive operation tells you how to use the program and what benefits you can expect.

Introducing QRAM™—the Quarterdeck memory optimizer

If you have an EMS 4.0 or EEMS board, QRAM (pronounced cram) can use it to free up more memory within the 0K to 640K area. Gain the additional 30-130K you need for those big programs and files. It looks at your AUTOEXEC.BAT and CONFIG.SYS files and figures out which TSRs, network and mouse drivers and DOS resources can be moved out of program memory.

And if you have an EGA or VGA-equipped PC and don't need graphics at the moment, QRAM will make an additional 96K of memory available! When you need graphics again, QRAM will switch you back to graphics mode!

Think how helpful that will be for those big dBASE files.

QRAM can't work miracles, but if there's memory available anywhere, QRAM lets you use it to boost your PCs performance.

QRAM is available bundled with Manifest for just a few dollars more than Manifest alone.

Manifest and QRAM—two more examples of Quarterdeck's commitment to giving you the most productivity out of the PC and software you own today.

Introducing two new Quarterdeck Expanded Memory Managers™ QEMM 50/60 and QEMM-386

QEMM is the all-in-one memory manager for breaking the 640K barrier.

QEMM 50/60 is for the PS/2™ series 50 and 60. It works with all IBM-compatible memory boards, and comes with a long list of adapter data to help you use your MCA hardware better.

QEMM-386 is for all 386-based computers, including older PCs with 80386 upgrade boards. It allows you to expand your RAM capacity—all the way to 32 megabytes, if you like.

Both give you expanded memory compatible with EMS 4.0 and EEMS. Both are also extended memory managers, compatible with XMS.

And both give you maximum control over your memory in the 640K-1024K area, guiding you through decisions on where to move TSRs and network drivers for maximum performance.

Manifest, QRAM, QEMM, and DESQview, our multitasking windowing environment—they're all designed to help you get the most from the software and PC you have today.

Yes! I need increased productivity on my current PC!

Payment ☐ Visa ☐ MasterCard

Expiration _____/_____

Card # ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Name ____________________

Address ____________________

City ____________ State ____ Zip ______

Qty	Product	5-1/4	3-1/2	Each	Totals
	Manifest 1.0			$59.95	
	QRAM and Manifest 1.0			$79.95	
	QEMM 50/60 v5.0 (with Manifest)*			$99.95	
	QEMM 386 v5.0 (with Manifest)*			$99.95	
	Shipping/Handling $5 in USA, $10 elsewhere				
	California Residents add 6.5%				
	Grand Total				

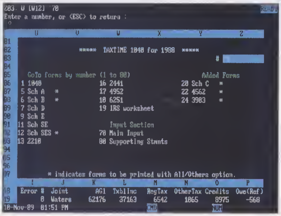
*Introductory offer expires 3/31/90

Quarterdeck Office Systems
150 Pico Blvd. Santa Monica, CA 90405
(213) 392-9851 Fax: (213) 399-3802

Quarterdeck

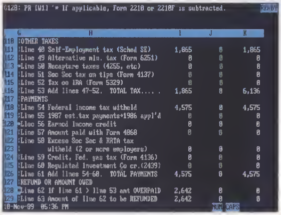
© 1989, Quarterdeck Office Systems

CIRCLE 109 ON READER SERVICE CARD



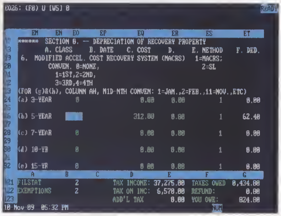
```
Z83: U [W12] '70                                                      READY
Enter a number, or <ESC> to return :

        U          V          W          X          Y          Z
81
82                 *****  TAXTIME 1040 for 1988  *****
83                                                      #
84
85    GoTo forms by number (1 to 80)                    Added Forms
86    1 1040               16 2441              20 Sch C    *
87    5 Sch A    *         17 4952              22 4562     *
88    6 Sch B    *         18 6251              24 3903     *
89    7 Sch D              19 IRS worksheet
90    9 Sch E
91   11 Sch SE                Input Section
92   12 Sch SES *          70 Main Input
93   13 2210               80 Supporting Stmnts
94
95
96
97           * indicates forms to be printed with All/Others option.
        I       J         K       L        M         N        O        P
98   Error #  Joint       AGI  TxblInc   RegTax OtherTax Credits Owe(Ref)
99         0  Waters    62176    37163     6542     1065    8975     -568
10-Nov-89  01:51 PM                     CMD              NUM
```

FIGURE 2. To help you keep track of your work, *TaxTime* marks the forms you've filled out with an asterisk. Like the other two templates, *TaxTime* displays the status of your return in a window at the bottom of the screen.



```
G128: PR [W1] '* If applicable, Form 2210 or 2210F is subtracted.     READY

   G                    H                              I         J         K
110 :OTHER TAXES
111 :Line 48 Self-Employment tax (Sched SE)        1,865         0     1,865
112 :Line 49 Alternative min. tax (Form 6251)          0         0         0
113 *Line 50 Recapture taxes (4255, etc)                0         0         0
114 :Line 51 Soc Sec tax on tips (Form 4137)           0         0         0
115 :Line 52 Tax on IRA (Form 5329)                    0         0         0
116 :Line 53 Add lines 47-52.  TOTAL TAX.... .     1,865         0     6,136
117 :PAYMENTS
118 :Line 54 Federal income tax witheld            4,575         0     4,575
119 :Line 55 1987 est.tax payments+1986 appl'd         0         0         0
120 *Line 56 Earned income credit                      0         0         0
121 :Line 57 Amount paid with Form 4868                0         0         0
122 :Line 58 Excess Soc Sec & RRTA tax
123 :        witheld (2 or more employers)             0         0         0
124 :Line 59 Credit, Fed. gas tax (Form 4136)          0         0         0
125 :Line 60 Regulated Investment Co cr.(2439)         0         0         0
126 :Line 61 Add lines 54-60.  TOTAL PAYMENTS      4,575         0     4,575
127 :REFUND OR AMOUNT OWED
128 *Line 62 If line 61 > line 53 amt OVERPAID     2,642         0         0
129 :Line 63 Amount of line 62 to be REFUNDED      2,642         0         0
10-Nov-89  05:36 PM                                          NUM CAPS
```

FIGURE 3. *TaxEase* provides on-screen help in the first column of each form, in cells containing an asterisk. When you place your cursor on one of these cells, the help text appears in the control panel at the top of the screen.



```
EO26: (F0) U [W5] 0                                                   READY

        EM     EN   EO      EP          EQ          ER         ES        ET
17  ******  SECTION 8. -- DEPRECIATION OF RECOVERY PROPERTY
18         A. CLASS     B. DATE    C. COST     D.      E. METHOD    F. DED.
19   6.  MODIFIED ACCEL. COST RECOVERY SYSTEM (MACRS)   1=MACRS;
20         CONVEN. 0=NONE,                                2=SL
21           1=1ST,2=2ND,
22           3=3RD,4=4TH
23  (FOR (g)&(h), COLUMN AH, MID-MTH CONVEN: 1=JAN.,2=FEB.,11=NOV.,ETC)
24  (a) 3-YEAR     0                0.00      0.00           1        0.00
25
26  (b) 5-YEAR                    312.00      0.00           1       62.40
27
28  (c) 7-YEAR     0                0.00      0.00           1        0.00
29
30  (d) 10-YR      0                0.00      0.00           1        0.00
31
32  (e) 15-YR      0                0.00      0.00           1        0.00
       A            B         C          D            E          F          G
121 FILSTAT         2               TAX INCOME: 37,275.00  TAXES OWED  8,434.00
122 EXEMPTIONS      2               TAX ON INC:  6,570.00  REFUND:         0.00
123                                 ADD'L TAX        0.00  YOU OWE:      824.00
10-Nov-89  05:32 PM                                   NUM
```

FIGURE 4. *Lotax* inserts help text in areas of its forms where it can be confusing. For example, on this Form 4562, the instructions are inserted between the column titles (row 18) and the actual entry space (rows 24-32). It's difficult to determine the proper column for your data.

form (the file containing the Form 1040 costs $95) and either a set of software fonts ($95) or a font cartridge ($195). However, the results are impressive (figure 1).

TaxTime can be too helpful in places. For example, next to a two-row line-item description in its schedule C, *TaxTime* places a row of X's in one of its protected cells so that you're sure to put your total on the other line. Unfortunately, it also prints this row of X's, which looks awkward and draws unwanted attention to your return. The publisher says that *TaxTime* includes a menu option that lets you choose not to print the X's, but I couldn't find that option, nor could I find mention of it in the documentation.

Most of the *TaxTime* users I spoke with had previously used mainframe-based tax preparation programs. Often, these programs prompt the user to enter all the appropriate tax data into a single worksheet from which the programs calculate and print the return. The users I spoke with prefer *TaxTime* because it enters most of their data directly into an on-screen representation of a tax form. This allows them to see the results of the return and correct any problems before printing out all the forms.

One user, a CPA who uses *TaxTime* to prepare several hundred returns a year, believes that the template should include Form 1040ES (used to pay estimated taxes) instead of charging extra for it. She also claims that *TaxTime*'s 2106 form, Employee Business Expenses, is more confusing than the IRS version.

TAXEASE

TaxEase's chief advantage is that it accepts each spouse's data separately and calculates the result of both separate and joint filing so that you can make an informed decision about which way to file.

Like *TaxTime, TaxEase* helps you by protecting all cells except those into which you enter data and by switching global protection on. Also, each form contains "hidden" help text that you can read in *1-2-3*'s control panel (figure 3). This feature lets you get the guidance you need quickly, and it doesn't clutter the screen with extra text.

But *TaxEase* has some quirks to watch for. If you or your spouse has more than one Form W-2, you must enter a formula that totals the amounts from each form. That's not difficult, but it gives you no easy way to refer back to information from an individual Form W-2 if you need it. Form 2210, which calculates any penalty you owe for underpaying your estimated taxes, can overestimate your penalty by as much as a dollar. That's not a lot of money, but the other two templates calculate this amount accurately. Also, when you save a file, *1-2-3*'s Calc indicator appears. This can give the false and disconcerting impression that you forgot to recalculate your worksheets before saving them.

TaxEase is divided into three files. Two of these files contain the most commonly used forms. When you enter data into one of these forms, the template automatically transfers that data into other forms requiring the same data. A third file contains some less commonly used forms. If you need to transfer data from one of these forms to another, you have to do it yourself.

In most cases, this division of forms is practical. However, one user I spoke to felt that Schedule R (Credit for the Elderly or the Disabled), used by retired government employees, should be moved to the third file and replaced with Form

4562, Depreciation and Amortization, which is used more frequently.

For an additional $10, bringing the total for the package to $79, *TaxEase*'s publisher includes a file containing your state-tax form. This option is available for 25 states, so contact the publisher to find out if they supply a form for your state.

LOTAX

Of the three templates, I found *Lotax* the hardest template to fill out. Most of my difficulties were a result of the template's confusing layout. For example, on Schedule B, used to calculate taxable income from interest, it's difficult to determine the correct cell in which to enter the name of your bank. It's even more difficult to determine which columns contain which data on Form 4562 (figure 4). Since *Lotax* automatically transfers this data to other forms when it finally calculates your taxes, it's important to get this data into the correct cell.

Unlike the other two templates, *Lotax* doesn't turn global protection on to prevent you from entering data into the wrong cell. This increases your chances of accidentally overwriting a formula that affects the outcome of your return.

> TAXTIME'S GREATEST COMPETITIVE ADVANTAGE IS ITS EASE OF USE.

Lotax has some inconsistencies that may confuse you and slow you down. For example, in some areas you answer *1* for *yes* and 0 for *no*; in others, you have to place an *x* in the appropriate position within a cell. In some sections, you type 0 to exit from a command; in others, you press the Escape key.

Lotax includes help text on the spreadsheet itself. One user I spoke with liked the product but felt the large volume of text on the screen could confuse a new user. I found that a lot of reading was necessary before I could enter my data in the correct order. ■

IN BRIEF

Lotax Personal Template. Siron Systems, P.O. Box 758, Tualatin, OR 97062; 503-656-1967. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0, *1-2-3* Release 1A, 2, or 2.01, and 384K of RAM (512K recommended). Released annually since 1984. $45; annual upgrades, $20. 30-day money-back guarantee.

TaxTime 1040 Individual. Austin Scientific, P.O. Box 1146, Menlo Park, CA 94026-1146; 800-433-1608, in Calif. 415-323-6338. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Uses 150K of RAM. Requires DOS 2.0 or higher, *1-2-3* Release 2.01 or higher, and 150K of RAM above that required for *1-2-3* Released annually since 1983. $95; annual upgrade, $55. 30-day money-back guarantee, less $10 restocking fee. 90-day defective-disk warranty.

TaxEase Individual. Park Technologies, P.O. Box 1317, Clifton Park, NY 12065; 800-423-3189, in N.Y. 518-877-5881. Runs on the IBM PC, PC XT, PC AT, PS/2, and compatible computers. Requires DOS 2.0 or higher, *1-2-3* Release 1A, 2, or 2.01, and 256K of RAM for use with *1-2-3* Release 1A or 384K of RAM for use with *1-2-3* Release 2.01. Released annually since 1986. $69 for federal program only; $79 for combined federal and state program; $74 for federal only on a 3½-inch disk; $84 for combined federal and state program on a 3½-inch disk. 30-day warranty.

HOW TO SURVIVE THE PAPERWORK JUNGLE

EXPEDITION 3.0
Features new cost worksheet and submittal packages.
Call for brochure.
1-800-423-0245

Expedition: For better control of construction contracts

Do you remember what you did on January 21, 1987? Expedition remembers. Expedition software for the IBM PC keeps an accurate record of all the paperwork critical to the contract: correspondence received, transmittals sent, submittals approved or rejected, subcontracts, bids, daily jobsite activity, requests and changes, meeting minutes and more. It lets you sort, select and summarize by date, by vendor, by item or by issue to give you an immediate status report—on screen or on paper.

The myth of the infallible memory
When you can't see the forest for the undergrowth, Expedition helps you follow the trail of a change from request for information through sketches, quotations and approval. Or, you can zero in on a specific issue, like masonry, and review everything connected to it: correspondence, materials received, requests for information, samples, meeting minutes and more.

The valley of the overlooked submittals
In the jungle of paper, it's easy to let a submittal slip by without proper action. With Expedition, you can track each one through any number of submission cycles—and generate on-screen or printed reports based on approval status, submittal status, drawing number, specification section, vendor, due date, days outstanding and days elapsed.

Be a hero
Every day's an adventure in the paperwork jungle. But now there's a way to stay a step ahead: Expedition. Contact Primavera today for more information and demo details.

EXPEDITION™
Survival Software for the Paperwork Jungle

PRIMAVERA SYSTEMS, INC.
Two Bala Plaza • Bala Cynwyd, PA 19004
800-423-0245 • In PA call 215-667-8600

CIRCLE 110 ON READER SERVICE CARD

NEW PRODUCTS

Compaq LTE and LTE/286: Redefining the Notebook Computer

At 8.5 by 11 by 1.9 inches, Compaq's new LTE computers may be the first full-function portables that are small enough to qualify as notebook-size. Or they may be the first notebook-size systems with enough features to qualify as full-function portables. Either way, they redefine the concept of notebook computers.

In appearance, the LTE and the LTE/286 are virtually identical. They are the same size and weight, and they share the same keyboard and screen. However, the LTE is a PC XT–class system powered by a 9.5-MHz 80C86 microprocessor, while the LTE/286 is a PC AT–class system built around a 12-MHz 80C286. The *C* in these microprocessor names indicates that the chips use CMOS technology. That makes them more expensive than standard 8086 and 80286 chips, but also less power hungry—an important consideration in a battery-powered portable. Like all XT–class PCs, the LTE was designed as a DOS machine, while the AT–class LTE/286 can run OS/2 as well.

RAM differences

The two machines also differ in their maximum RAM capacity. The LTE has one memory-upgrade option: You can boost RAM from its standard 640K RAM to 1 megabyte. For the LTE/286, you can get either a 1-megabyte board, which brings RAM up to 1.6 megabytes, or a 2-megabyte board, for a total of 2.6 megabytes. Both systems come with Compaq Expanded Memory Manager. Compaq says CEMM supports the Lotus/Intel/Microsoft Expanded Memory Specification 4.0, which means you can work with *1-2-3* spreadsheets that won't fit in 640K of conventional memory.

Other differences: You can get a 20-megabyte hard disk for either system, but a 40-megabyte hard disk is available only for the LTE/286, as is an optional math coprocessor.

Unlike the NEC UltraLite, the Zenith MinisPort, and other notebook-size computers that have sacrificed disk drives for size, the LTE systems come with a standard 3½-inch disk drive. The ¾-inch-high drive is tucked cleverly under the keyboard and is easy to get at. The drive makes it easy to move data or programs between the LTE and a desktop system: You simply copy a file to disk in the normal way. With diskless PCs, you have to cable the computers together and run a file-transfer program.

The LTE display also gets high marks. The electroluminescent, supertwist LCD screen is CGA-compatible. The resolution of 640 by 200 pixels makes the display eminently readable, but both LTEs let you connect an external CGA monitor, if you want.

Compaq's LTE (right) and LTE/286 (left) look alike but use different CPUs.

The keyboard may take a bit of getting used to. Compaq, like most makers of small portables, has compromised on keyboard design. It has changed the standard keyboard layout to fit the available space, while retaining the standard key spacing between keys. The keyboard does have an embedded numeric keypad, but if you plan to do much numeric entry, you should consider the optional external numeric keypad ($119).

Batteries and adapters

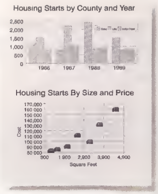
Without the optional 11-ounce hard disk, the LTE systems weigh 6 pounds, including the removable battery pack. The batteries should last about 3½ hours between charges, according to Compaq. If you plan to use the system for extended periods, you can get extra battery packs for $129 each. The included internal AC adapter will recharge the batteries in 8 to 10 hours; or you can buy the external adapter, which Compaq says will recharge the batteries in 1½ hours. The external adapter costs $199.

Other features and options worth mentioning include a 9-pin serial and a 25-pin parallel connector; power-on password protection, which means you can't use the system unless you know the password; an optional 2,400-bps internal modem ($449); and an optional auto-

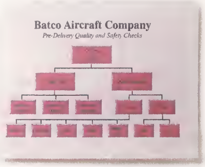
ALSO IN THIS SECTION

BUSINESS, FINANCE 92
MANUFACTURING. 92
REAL ESTATE 93
MOUSE SOFTWARE 93
OTHER SOFTWARE. 93
TRAINING, REFERENCE 94
UPGRADES 94

Wow.

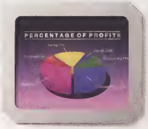


Print multiple charts on the same page. (PostScript device)

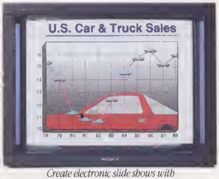


Automatic organizational charting makes it easy to put everything in its place.

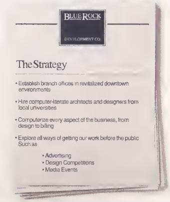
Let your imagination run wild using the advanced drawing tools.



Get slides or transparencies overnight from the ASHTON-TATE GRAPHICS SERVICE.™



Create electronic slide shows with professional transitions. (VideoShow)



BLUE ROCK
DEVELOPMENT CO.

The Strategy

- Establish branch offices in revitalized downtown environments
- Hire computer-literate architects and designers from local universities
- Computerize every aspect of the business, from design to billing
- Explore all ways of getting our work before the public Such as
  - Advertising
  - Design Competitions
  - Media Events

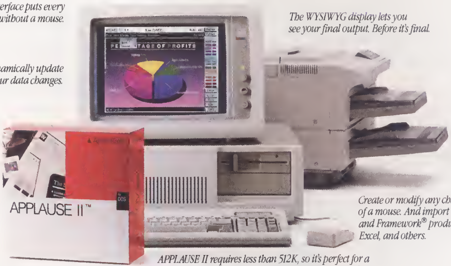
You'll have letter by letter control of fonts, color, and rotation. (HP LaserJet)

How.

The "Windows"-like interface puts every option near at hand. With or without a mouse.

"Warm links" dynamically update your charts as your data changes.

The WYSIWYG display lets you see your final output. Before it's final.



Create or modify any chart with the click of a mouse. And import data from dBASE® and Framework® products, Lotus 1-2-3, Excel, and others.

APPLAUSE II requires less than 512K, so it's perfect for a network. And it supports graphics boards from CGA to VGA.*

INTRODUCING APPLAUSE II.

Finally, knockout business graphics anyone can knock out—on anything.

In full color or black-and-white. As printed documents, overheads, or slides. On everything from your older 512K PC XTs and ATs to the newest 386 screamers. With the laser printers, plotters, and scanners you're already using.

And since APPLAUSE II™ uses an intuitive "Windows"-like environment with pull-down menus, all this power is within easy reach of virtually anyone.

Want to see more? See your nearest Ashton-Tate dealer or call 1-800-437-4329, ext. 1301. We'll send you a free demo disk that'll show you how you can wow them at your next presentation.

DRAW APPLAUSE & MASTER GRAPHICS USERS

Upgrade to APPLAUSE II
For Only $79
Call 1-800-2ASHTON

Ashton-Tate®

---

*CGA displays monochrome

Trademarks/owner APPLAUSE II, DRAW APPLAUSE, MASTER GRAPHICS, Ashton-Tate, Ashton-Tate logo, dBASE, Framework, ASHTON-TATE GRAPHICS SERVICE/Ashton-Tate Corporation Other product names or trademarks shown herein are for illustrative purposes only and may be the property of other companies © 1990 Ashton-Tate Corporation All Rights Reserved

mobile adapter ($129). Both systems come with a one-year warranty.

At the moment, the LTE systems have no direct competition. A few notebook-size systems are somewhat lighter, but they can't offer a floppy-disk drive or a hard-disk option. The Compaq LTEs are the notebook computers that the competition has to beat. *—Marc Davidson*

Compaq Computer Corp., 20555 SH 249, Houston, TX 77070-2000; 713-370-0670. Compaq LTE, $2,399; with 20-megabyte hard disk, $2,999; memory upgrade to 1 megabyte, $349; DOS 3.31, $120; DOS 4.01, $150. Compaq LTE/286, $3,899; with 20-megabyte hard disk, $4,499; with 40-megabyte hard disk, $4,999; 1 megabyte additional memory, $699; 2 megabytes additional memory, $1,299; 12-MHz math coprocessor, $799; OS/2 Standard Version 1.1, $340.

CIRCLE 1 ON READER SERVICE CARD

BUSINESS, FINANCE

Make Valuation, Prospectus for Closely Held Business

DealMaker (a trademark of ValuSource) analyzes the purchase or sale of any closely held business. It includes a sales/purchase feasibility study and several approaches for appraising a business. The software allocates asset values and automatically prepares a sales prospectus with an optional report writer ($195). The program will also review the cost to the buyer, the proceeds to the seller, the backup security, and the prospect that the business will pay for the purchase. The documentation provides a primer on the basics of valuing a business and structuring a deal.

Requires *1-2-3* Release 2.01 or higher and a minimum of 640K of RAM. $395, from Jian Tools For Sales, 127 Second St., Suite 2, Los Altos, CA 94022; 800-442-7373, in Calif. 415-941-9191.

CIRCLE 2 ON READER SERVICE CARD

File Sales Tax for any State, County, City, or Town

Sales Tax automates the entire process of sales tax–compliance with any state or local unit of government. The program lets you download sales data from a mainframe, minicomputer, or PC. It automatically creates and prints a signature-ready sales tax–return for as many states as necessary.

Requires *1-2-3* Release 2.01 or higher, appropriate communications hardware and software, and 640K of RAM. $11,700 for the complete system, including monthly tax updates and support; individual modules available separately. From Vertex, 1041 Old Cassatt Rd., Berwyn, PA 19312; 215-640-4200.

CIRCLE 3 ON READER SERVICE CARD

1-2-3 Template to File and Plan Business-Income Tax

FAS-96 for 1-2-3 lets corporations use the balance-sheet approach to comply with the Federal Accounting Standards Board's accounting regulations for income taxes, also referred to as FASB 96. The program lets you calculate your tax liability as of any date and calculate both your regular-tax and alternative-minimum-tax liabilities. You can use it with financial data from 1984 through 1995. Data for additional years is available at extra cost.

Requires *1-2-3* Release 2.01 or higher and 640K of RAM. $495, from Intex Solutions, 161 Highland Ave., Needham, MA 02194; 617-449-6222.

CIRCLE 4 ON READER SERVICE CARD

Template for Preparing Private-Offering Circular

P.P. Memo (for private-placement memorandum) provides the documents necessary to handle the offering of Regulation D exempt securities for investments of under $1 million. Sales of these securities are reported, but the securities themselves are exempt from the formal registration process of the Securities and Exchange Commission (SEC), pursuant to the Securities Act of 1933 and rule 504. The software, which consists of *1-2-3* worksheets, prompts you for the necessary information. You do not need to know how to use *1-2-3* itself.

Requires *1-2-3* Release 2.01 or higher and a minimum of 512K of RAM. $149, from Jian Tools For Sales, 127 Second St., Suite 2, Los Altos, CA 94022; 800-442-7373, in Calif. 415-941-9191.

CIRCLE 5 ON READER SERVICE CARD

Perform Risk Analyses on Your Existing 1-2-3 Worksheet Data

Plan lets you make projections using any number of independent variables in your worksheet. For each variable you enter low, expected, and high values. *Plan* will automatically create a skewed–bell curve summarizing the probability of each outcome. It will also produce separate graphs for each independent and dependent variable. *Plan* can be used with any existing worksheet—without modifying your data or formulas—and is based on a modified beta distribution.

Requires *1-2-3* Release 2 or higher and 110K of RAM over that required by *1-2-3*. $495, from Plan Systems International, 11693 San Vicente Blvd., Suite 350, Los Angeles, CA 90049; 800-648-5353 ext. 100, in Calif. 213-551-6658, to order a free demonstration disk.

CIRCLE 6 ON READER SERVICE CARD

MANUFACTURING

Manufacturing Overview and Control on Nine Worksheets

Manufacturing 9-Pack helps you interpret manufacturing conditions and institute controls. It gives you manufacturing-oriented financial reports. The reports cover a master schedule, a bill of materials, an inventory model, job tracking, a quality-assurance form, labor costs, project-cost tracking, and inventory-supply management.

Requires *1-2-3* Release 2.01 or higher and a minimum of 512K of RAM. $99, from Jian Tools For Sales, 127 Second St., Suite 2, Los Altos, CA 94022; 800-442-7373, in Calif. 415-941-9191.

CIRCLE 7 ON READER SERVICE CARD

Model Your Business to Better Anticipate its Success

Production↔Equalizer lets you create a model of your sales-, manufacturing-, or service-related business. This lets you gauge the financial effect of a plan before you implement it. Your financial-impact model includes a master schedule of finished goods and services; a master table of items; a costed bill of materials and labor; an 80/20-rule (or Pareto) analysis; an inventory model; a projection of costs for direct labor, earned overhead absorption, and personnel loading; and statements of operations, cash flow, and return on investment or sales.

The program helps to answer the following questions: How fast can you ramp up or cut back? What is your inventory position? What are your labor costs? Do you need to hire more people or should you go into overtime with your current work force? Can the demand of the forecast be met? What are the effects of seasonal trends?

Requires *1-2-3* Release 2.01 or higher and a minimum of 640K of RAM. $149, from Jian Tools For Sales, 127 Second St., Suite 2, Los Altos, CA 94022; 800-442-7373, in Calif. 415-941-9191.

CIRCLE 8 ON READER SERVICE CARD

REAL ESTATE

1-2-3 Template Used for Rent-Roll Analysis

Rollin will project annual income for any income-producing property. This procedure is also known as "rent-roll analysis." The macro-driven template takes into account the dates and terms of each lease, pass-throughs, and percentage rents. In addition, you can assign a pro rata or actual amount of taxes, insurance, and common area maintenance to each tenant, plus any renewal options. The worksheet provides input to the publisher's *RITA* template (see next item) or its results can be used independently.

Requires *1-2-3* Release 2 or higher and 91K of RAM. $129.95; with *RITA*, $359.95, from THG Associates, 37 Dorset St., East Longmeadow, MA 01028; 413-785-5577.

CIRCLE 9 ON READER SERVICE CARD

1-2-3 Template to Assess Risk of Real Estate Investment

RITA (Realty Investment Template Analysis) helps you measure the risk associated with any realty investment. You can analyze the risks of shopping centers, office buildings, apartment complexes, or any other income-producing property. The macro-driven template produces reports of sources and applications of funds, profit and loss, internal rate of return, and six other investment analyses, plus graphs. It can produce a basic rent roll or automatically consolidate a more detailed rent roll from the publisher's *Rollin* template (see item above).

Requires *1-2-3* Release 2 or higher and 162K of RAM. $249.95; with *Rollin* $359.95, from THG Associates, 37 Dorset St., East Longmeadow, MA 01028; 413-785-5577.

CIRCLE 10 ON READER SERVICE CARD

MOUSE SOFTWARE

Mouse Drivers Let You Create and Customize 1-2-3 Menus

Mouse Patch lets you use a mouse to select menu options and highlight ranges, as well as cut and paste parts of your worksheet. You can also substitute *Mouse Patch*'s custom menus for *1-2-3*'s native menus. The custom menus offer context-sensitive help.

Requires *1-2-3* Release 2.01 or 2.2, 18K of RAM, and a Microsoft Mouse–compatible mouse. At press time, a version for *1-2-3* Release 3 was expected to be available by the end of the first quarter. $29.95, from Mostly Mice Software, 125 Gates Ave., Montclair, NJ 07042; 800-926-6873, in N.J. 201-746-9256.

CIRCLE 11 ON READER SERVICE CARD

Enhance Mouse Performance

MicroSpeed Mouse Utilities improves the performance of any mouse by adding an accelerator algorithm. The algorithm lets you instruct the cursor to move farther in response to a quick movement of the mouse than it would in reponse to a slow movement of the same distance. The program does not change the mouse's resolution.

Microspeed Mouse Utilities works with Microsoft, Logitech, and Mouse Systems mouse products. In companies where more than one kind of mouse is in use, you can operate all mouse devices under a single driver.

Requires 16K of RAM and DOS 2.0 or higher. $39.95, from MicroSpeed, 44000 Old Warm Springs Blvd., Fremont, CA 94538; 800-232-7888, in Calif. 415-490-1403.

CIRCLE 12 ON READER SERVICE CARD

OTHER SOFTWARE

Library of Functions for Add-In Toolkit Developers

The Developer's Library, for users of the Lotus Add-In Toolkit, increases the types of mathematical, engineering, scientific, and statistical functions available to an add-in developer. With it you can more easily produce applications, macros, and @functions. The functions are a superset of the @functions available from GreyMatter International's IRG Information Systems division's *@Library* series of add-ins.

Requires the Lotus Add-In Toolkit and *1-2-3* Release 3. $295, from GreyMatter International, 100 North Country Rd., Setauket, NY 11733; 516-689-7682.

CIRCLE 13 ON READER SERVICE CARD

Graphics-Tracing Program for Freelance Plus

QuickTrace converts scanned images stored in TIFF format into CGM Metafile format. Once in the new format, you can use *Lotus Freelance Plus* to read the image and edit it. *QuickTrace* has three methods of converting a scanned image to produce the best possible result.

Requires 640K of RAM and an uncompressed TIFF file. $245; $171.50 until 3/30/90, from Mitsubishi International Corp., Technology Affairs Dept., 520 Madison Ave., New York, NY 10022; 212-605-2339.

CIRCLE 14 ON READER SERVICE CARD

Draw-and-Graph Program Uses WordPerfect Graph Format

DrawPerfect, a presentation graphics program, lets you graph, draw, and create on-screen presentations. The program comes with a library of 500 images and lets you import 14 types of graphics-file formats. The program's text editor has word wrap, offers 20 built-in fonts, and works much like *WordPerfect*, with which it shares function-key assignments.

The files stored with *DrawPerfect* and the files in the library are in *WordPerfect* graphics format (WPG), so that they can be imported into a *WordPerfect* document. With *DrawPerfect* you get the *Menu Shell* utility, which is a module in *WordPerfect Office 3.0* that lets you use *DrawPerfect* to edit graphics within your *WordPerfect* document. *DrawPerfect* offers three different user interfaces: pull-down menus, icons, and function keys.

Runs on an IBM PC, PS/2, or compatible computer with a graphics adapter and 384K of RAM. $495 for stand-alone or file-server versions; from WordPerfect

ANDREA BARRETT

Corp., 1555 North Technology Way, Orem, UT 84057; 801-222-4000.
CIRCLE 15 ON READER SERVICE CARD

Easy-to-Use Database-Application Developer

Clarion Personal Developer lets people with no knowledge of databases create simple database applications immediately. The product creates both the database file and the programs that control its use. After some use, the user should be able to create complex applications, such as order-entry and invoicing programs.

The program lets you create stand-alone applications that can be distributed without paying any subsequent licensing fees. *Clarion Personal Developer* creates applications and files that are compatible with those created with *Clarion Professional Developer*. The program can both import files from and export files to *dBase II, dBase III*, and *1-2-3*, as well as delimited ASCII and DIF files.

Runs on an IBM PC, PS/2, or compatible computer with one floppy-disk and one hard-disk drive, 512K of RAM, and DOS 2.1 or higher. $199, from Clarion Software Corp., 150 East Sample Rd., Pompano Beach, FL 33064; 800-354-5444, outside the United States 305-785-4555.
CIRCLE 16 ON READER SERVICE CARD

TRAINING/REFERENCE

1-2-3 Release 3/2.2 Courses for Experienced Users

The Lotus 1-2-3 Release 3 Training Series and *The Lotus 1-2-3 Release 2.2 Training Series* each consist of two videotapes, two guidebooks, and two disks. Both are designed for experienced users of *1-2-3*.

Training for Release 2.2 covers file linking, Undo, the Macro Library Manager, new macro features (including Learn), and *Allways*. Training for Release 3 includes 3-D worksheets, zoom, search and replace, new printing features, new graphing features, Learn, macro libraries, and new data-management features.

Requires *1-2-3* Release 2.2 or 3 and a VHS, Beta, or U-Matic videotape player. $545 for each series; $30 each per additional guidebook/disk set. From Learn-PC, 5101 Highway 55, Minneapolis, MN 55422; 800-532-7672, in Minn. and Canada 612-544-4500.
CIRCLE 17 ON READER SERVICE CARD

Instructor-Led Courseware for 1-2-3 Release 2.2

Lotus 1-2-3 Release 2.2 Spreadsheet and Database and Graphics provides a complete course for both instructor and students. The starter package consists of an instructor's guide with color overhead transparencies. It also has 12 student manuals that include data disks and instructions for practicing the lessons presented by the instructor.

Requires *1-2-3* Release 2.2. $900 for the starter package, free upgrades for two years from date of purchase, and unlimited toll-free support; $26 for additional student manual and disk; discounts available. From Logical Operations, 595 Blossom Rd., Rochester, NY 14610; 800-456-4677, in N.Y. 716-482-7700.
CIRCLE 18 ON READER SERVICE CARD

Add-In Toolkit Newsletter

Technically Speaking is a monthly journal for users of the Lotus Add-In Toolkit for Release 3 who are developing applications for *1-2-3* Release 3. It provides programming techniques, sample applications of the programming language, and technical descriptions of the various elements of the Toolkit.

$120 per year; $15 per issue. From GreyMatter Publishing, 100 North Country Rd., Setauket, NY 11733; 516-689-7682.
CIRCLE 19 ON READER SERVICE CARD

UPGRADES

Sideways Version 3.3 now contains an add-in for *1-2-3* Release 3. It lets you print text files and WKS or WK1 files. The program also includes add-ins for *1-2-3* Releases 2/2.01 and 2.2 and for all releases of *Symphony*.

$89.95; upgrades from any previous version, $30. From Funk Software, 222 Third St., Cambridge, MA 02142; 800-822-3865, in Mass. 617-497-6339.
CIRCLE 20 ON READER SERVICE CARD

BizPlanBuilder Version 4.0 provides text and formulas to help you create a business plan quickly and easily. The *1-2-3* worksheet prompts you for information, so you need not know *1-2-3* to use it. Advanced users can edit the worksheet if they wish.

Requires *1-2-3* Release 2.01 or higher and a minimum of 512K of RAM. $99, from Jian Tools For Sales, 127 Second St., Suite 2, Los Altos, CA, 94022; 800-442-7373, in Calif. 415-941-9191.
CIRCLE 21 ON READER SERVICE CARD

Rescue Plus Version 1.2 will now recover lost files that were originally saved with *1-2-3* Release 2.2 or any previous release of *1-2-3* or any release of *Symphony*. The new release will recover files that have been damaged more severely than the level of damage the previous version would recover. It lets you recover lost Lotus files that generate the error message *Part of file is missing*. It also lets you recover data stored in bad sectors and helps you piece the sectors together into a new file.

Requires 256K of RAM. $119.95; upgrade for $45 plus $5 shipping charge. From Intex Solutions, 161 Highland Ave., Needham, MA 02194; 617-449-6222.
CIRCLE 22 ON READER SERVICE CARD

Andrew Tobias' Tax Cut lets you prepare a signature-ready federal tax return. The program not only prompts you to fill in entries on the tax forms, but provides lay explanations of the methods involved. The program automatically checks your return for entries that might trigger a tax audit and suggests an alternate approach. *Tax Cut* imports data directly from files prepared by using *Andrew Tobias' Managing Your Money* or *Andrew Tobias' Check Write Plus*.

You can send your return stored on a floppy disk to an electronic filing agency, and that agency will submit it electronically to the Internal Revenue Service. That filing method should enable the I.R.S. to process the return more quickly.

Requires an IBM PC, PS/2, or compatible computer with a hard disk or two floppy-disk drives, and 512K of RAM. $79.95, from MECA Ventures, 327 Riverside Ave., Westport, CT 06880; 203-226-2400.
CIRCLE 23 ON READER SERVICE CARD

Information for New Products is supplied by the vendors and was up-to-date as of 12/15/89. Since production specifications change frequently, we recommend that you verify this information with a dealer before making a purchase.

ANDREA BARRETT

STORE YOUR *LOTUS* DATA FOR YEARS…

In handsome library cases designed expressly for *LOTUS* subscribers. Cases are deep red with embossed silver lettering. Each is sturdily constructed and holds one year (12 issues) of *LOTUS*.

1 for $7.95, 3 for $21.95
or 6 for $39.95.

(Plus $1 per case for postage and handling within the U.S., or $2.50 per case shipped to Canada and beyond. PA residents add 6% sales tax.)

MAIL TO:
Jesse Jones Industries
PO Box 1165, Kendall Square
Cambridge, MA 02142

Please send me ______ *LOTUS* library cases.
Enclosed is my check or money order payable to Jesse Jones (in U.S. currency) for $________
or charge my ☐ VISA ☐ MasterCard ☐ AMEX.

NAME

SIGNATURE

CARD NO.

EXPIRATION DATE

ADDRESS (Street address only)

CITY

STATE ZIP

Satisfaction guaranteed by Jesse Jones Industries or money refunded. Please allow up to six weeks for delivery.

LOTUS Back Issues

Fill the gaps in your *LOTUS* magazine library. Limited quantities of back issues are available at $5 each.

For an order form and a complete index of *LOTUS* articles, please write:

LOTUS
Single Copy Sales
P.O. Box 9123
Cambridge, MA 02139-9123

All orders are prepaid in U.S. funds only. Foreign orders: to Canada, $7/copy; to other countries, $10/copy (airmail).

CIRCLE 116 ON READER SERVICE CARD

FORECAST *PRO*

When Accuracy Counts, Count on the Expert

PC MAGAZINE EDITORS' CHOICE

"FORECAST PRO is an effective forecasting tool that will save you time, improve the accuracy of your forecasts, and educate you on the nature of time series data. FORECAST PRO is a winning package"
— PC Magazine, March 14, 1989

For a free demonstration disk
☎ *CALL NOW!*
BFS (617) 484-5050
Business Forecast Systems
68 Leonard Street, Belmont, MA 02178

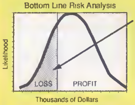
CIRCLE 112 ON READER SERVICE CARD

LOTUS Reprints

Train and educate personnel . . . present information . . . provide literature to users of your product or service . . . with reprints of *LOTUS* articles or advertisements.

Reprints in quantities of 1,000 or more are available at low cost. For more information, call Kris Benoit, *LOTUS* Production Dept., 617-225-6841.

Eliminates Multiple What-Ifs!

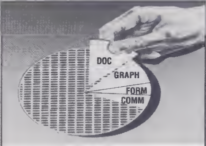


Did you know about the 30% risk of loss?

Call for: FREE PLAN™ DEMO
1-800-648-5353 X100
24 HOURS

PLAN Systems International
11693 San Vicente Blvd., Suite 350
Los Angeles, CA 90049 213/551-6658

CIRCLE 115 ON READER SERVICE CARD



EXTRA K™ FOR SYMPHONY

Symphony users can get thousands more worksheet cells, even with Expanded Memory! Unload unused Symphony environments (DOC, COMM, FORM, and/or GRAPH) and regain this memory for your worksheet.

Lerman Associates
12 Endmoor Rd., Westford, MA 01886
1-800-233-4671 or 508-692-7600
$79.95 plus $4 ($12 foreign)

CIRCLE 114 ON READER SERVICE CARD

Buy or Sell New or Used

Computers via Modem

We have the source to turn your Printers, PC's, Drives, & Terminals, into *fast* Cash. Search our DATABASE for obsolete or unique gear, seconds, surplus or new excess inventory. Sell yours or buy theirs direct, 24 Hrs a day. Never a commission. Modem #900-568-1234 @ .99¢ per minute Set to: 3/12/2400 bd, 8 bts, 1 stp, ANSI on.

No modem? No problem. Fax us your eq. listing on our form. Cost $12.95 per minute Fax 900-468-1234 Audio text info: **401-272-9980**

Computer Search USA
1 Richmond Sq, Providence, RI 02906

CIRCLE 113 ON READER SERVICE CARD

WINDOWS HAS A BRIGHT FUTURE

BY CAROLE PATTON

When it comes to the future of *Windows*, Microsoft Corp. is as hard to pin down as a politician. Until last November, the party line, according to Microsoft CEO Bill Gates, was "Write software for *Microsoft Windows* first, then for OS/2." Afterward, Microsoft made a 180-degree turn and, during a joint press conference with IBM at Comdex/Fall '89, designated OS/2 Presentation Manager, and not *Windows*, as top dog. Moreover, Microsoft said it would limit future *Windows* enhancements. *Windows* will never have "advanced" OS/2 features, Gates swore. In exchange, IBM endorsed *Windows* for the first time—a victory for Microsoft.

Then, a week after Comdex, squawking developers were assured that *Windows* would continue to be improved. Questioned on CompuServe, Gates responded, "All we said [at Comdex] was that features like long file names, threads, and the 32-bit [flat-memory model] don't make sense, since we run on DOS. When people see the next version [of *Windows*], they will understand that nothing is being held back. Both OS/2 and *Windows* will be improved as much as they can be."

Some people felt threatened by the prospect of the next *Windows* version, known as *Windows* 3.0, even though Microsoft continues to position it as a low-end product and OS/2 as a high-end product. Developers who believed *Windows* was just a training-wheels program for OS/2 were angry when news of *Windows* 3.0 leaked out last summer. That's because *Windows* 3.0 will diminish the need for OS/2 on the desktop.

This upgrade is no toy. *Windows* 3.0 uses memory in protected mode (as does OS/2 Presentation Manager) and provides up to 16 megabytes of memory. Beyond that or beyond your machine's memory capacity, it can use hard-disk memory. Was it only a year ago that Gates said *Windows* would never break the 640K barrier? One reason *Windows* is making such a splash is that it gives users the expensive Macintosh icons-and-mouse approach at a fraction of the Mac's hardware cost. Even on a $1,000 PC clone, *Windows* 3.0 delivers an interface nearly identical to Presentation Manager.

But while the interface is important, there is another reason behind *Windows*' growing popularity. Its core applications, such as word processing, spreadsheet, and databases, are reaching critical mass.

OS/2, on the other hand, has today but a handful of applications. Essential elements, such as printer drivers, are slow in coming. Microsoft estimates it will sell close to one million copies of OS/2 in 1990, but that sales figure is wishful thinking. The computing needs of most people do not require an operating system as complex as OS/2—a fact that engineering companies, such as Microsoft and IBM, tend to ignore.

Currently, OS/2 requires extensive RAM (3 to 4 megabytes) and lots of hard-disk space. DOS programs, if they run at all under OS/2, are restricted to OS/2's so-called compatibility box. I predict that most corporations won't move to OS/2 for years. An 80286 or 80386 personal computer that has 4 to 6 megabytes of RAM, a 60-megabyte hard disk, and that can run OS/2 costs at least $5,000. Perhaps if Microsoft's Gates and IBM's James Cannavino (who heads IBM's Entry Systems Division) had to pay for their own hardware and software, they'd get the picture.

True, software companies, such as Lotus Development Corp. and WordPerfect Corp., have a lot to lose from *Windows*. As Microsoft's archcompetitors, Lotus and WordPerfect bypassed *Windows* to plow millions of dollars into OS/2 programs. Lotus's *1-2-3* Release 3 will run under *Windows/286* but not under *Windows/386*. And although WordPerfect is developing a graphical product for *Windows*, that product won't be ready until late next summer. Microsoft doesn't care whether users favor *Windows* or OS/2, since it makes money either way. But IBM, codeveloper of OS/2, has more at stake. Recently, Big Blue said that its upcoming version of OS/2 will run in just 3 megabytes of memory instead of 4 and that work is underway to develop a 2-megabyte version.

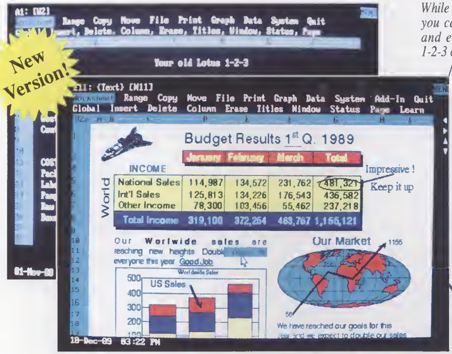
As for the future, *Windows* will remain a strong addition to DOS. It will probably hinder OS/2's growth. Sure, OS/2 is a better operating system, but users buy software on the strength of applications.

It's too late for Microsoft or IBM to determine the future of personal computing totally. The results are already in. *Windows* is a success. ■

Carole Patton is publisher and editor of Acknowledge The Window Letter, *a software-industry newsletter based in Mendham, N.J.*

KEVIN HAWKES

New For 1-2-3


A1: [W2]
Worksheet Range Copy Move File Print Graph Data System Quit
Global Insert, Delete, Column, Erase, Titles, Window, Status, Page
Your old Lotus 1-2-3
New Version!
E11: {Text} [W11]
Worksheet Range Copy Move File Print Graph Data System Add-In Quit
Global Insert Delete Column Erase Titles Window Status Page Learn
Impressive !
Keep it up
Worldwide Sales
US Sales
Our Market
1155
50
01-Nov-89
18-Dec-89 03:22 PM

Budget Results 1st Q. 1989

INCOME

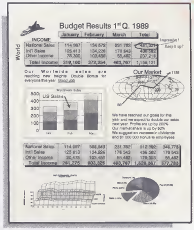
World	January	February	March	Total
National Sales	114,987	134,572	231,762	481,321
Int'l Sales	125,813	134,226	176,543	436,582
Other Income	78,300	103,456	55,462	237,218
Total Income	319,100	372,254	463,767	1,155,121

Our **Worlwide sales** are reaching new heights Double ... everyone this year Good Job

We have reached our goals for this year and we expect to double our sales

While in IMPRESS you can edit cells and even use all 1-2-3 commands.

Lotus 1-2-3 stays fully active in graphics mode with IMPRESS. 1-2-3 works just like before, only now you have your own customized 1-2-3 screen display and reports.



What you see on your new 1-2-3 screen is what you get on paper.

When your 1-2-3 Worksheet looks IMPRESSive so do You . . .

When your Lotus 1-2-3 worksheets look impressive so do you. IMPRESS from PC Publishing gives 1-2-3 true desktop publishing features that enable you to create eye-catching and persuasive worksheets.

1-2-3 Stays Fully Active

While in IMPRESS you can call all 1-2-3 commands and menus. You can also edit cells. (Unlike Allways you never need to revert back to text mode for editing cells.)

Mouse Support & Drawing Tool Box

IMPRESS brings a true graphic interface to Lotus 1-2-3. Full mouse support to call menus or open windows. Even a drawing tool box that allows you to draw any image in 1-2-3. Get a professional look quickly and easily without ever leaving 1-2-3.

Compress or Enlarge Worksheets

You can customize your 1-2-3 screen display with drawings, colors, grids and new exciting fonts. You can also zoom in and out to compress worksheets or enlarge them. See twice as many rows and columns of your worksheets on screen. No more scrolling around.

Mix Numbers, Text and Graphics

Create a professional report with numbers, graphs, images and text all on one page. Your graphs are customized. Your text automatically word wraps and is justified. You have a choice of different type styles and sizes with different fonts (3 pts. to 72 pts.). Many Bitstream Fonts included. Your images are created with the drawing tool box or imported from Freelance.

Also Prints Sideways

Print sideways with all printers from dot matrix to laser and desk jets. Print exciting colorful reports with color printers. IMPRESS can also compress worksheets automatically so they fit any page size you want.

Customize Graphs or Forms

Graphs can be real time synchronized with your worksheet. You can also include .PIC files or Freelance files. Customize your 1-2-3 graphs with arrows, explanations, fancy titles and drawings. Draw lines, boxes, grids or even freehand to create any form or invoice from inside 1-2-3. Then fill up your forms on screen and simply print them.

Easy to Use

If you know how to use 1-2-3, you already know how to use IMPRESS, it's fast and easy. There is no learning period. IMPRESS uses 1-2-3 like menus that you are already familiar with.

Allways and 1-2-3 Rel 2.0, 2.01, & 2.2 Compatibility

If you have Allways IMPRESS imports Allways files automatically. So you can improve them, print them sideways, or simply work on them without having to toggle to text mode. IMPRESS works with 1-2-3 Rel 2.0, 2.01, & 2.2.

Technical Requirements

IMPRESS works with: *1-2-3 release 2.0, 2.01 or 2.2, DOS 2.0 or later, CGA, EGA, VGA or Hercules (No color in CGA). Supports all graphics printers that work with 1-2-3. including Dot Matrix, Plotters, Desk Jet, Laser printers (Hewlett Packard, Postscript, etc. .), Color printers IMPRESS occupies 93k RAM above 1-2-3 (uses EMS if available). Many Bitstream Fonts included with package 1-2-3 is a registered trademark of Lotus Development Corp. Allways is a registered trademark of Funk Software.*

	Allways	IMPRESS
1-2-3 stays fully functional & interactive	No	Yes
Enhance & customize 1-2-3 screen display	No	Yes
Print sideways on all printers	No	Yes
Synchronized live graphs	No	Yes
See more rows & columns on screen	No	Yes
Drawing tool box	No	Yes
Import Freelance images or graphs	No	Yes
Word processing capabilities	No	Yes
Customize graphs with arrows, frames, drawings	No	Yes
Full mouse support	No	Yes

"Which is better? . . . IMPRESS is the clear winner. It boasts nearly every additional feature I wished for when I reviewed Allways."
5/16/89 — **PC Magazine**

"IMPRESS . . . a clear leader worthy of an excellent score. If you like Allways, you'll love IMPRESS."
9/4/89 — **Infoworld**

"Works magic . . . the tremendous improvement over 1-2-3's screens and reports is obvious."
3/89 — **Lotus Magazine**

$149.95

PC Publishing

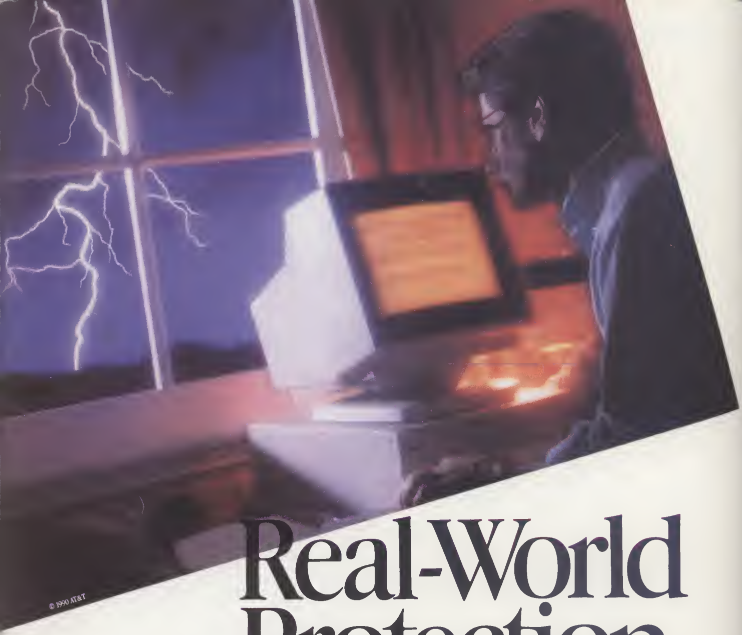
PC PUBLISHING
1801 Avenue of the Stars, #815
Los Angeles, CA 90067
(213) 556-3630 **1-800-634-4555**

Send me ___ (qty) **IMPRESS** at $149.95 each plus $5.00 shipping/handling. CA residents add 6 $^3/_4$ % sales tax.

Name ____________________
Company ____________________
Address ____________________
City ____________ State _____ Zip ______
Phone ( ) ____________________
Bill to ☐ Visa ☐ MC ☐ AMEX ☐ Check
Card No. ____________ Exp. ___/___

30 Day Money Back Guarantee LTS 2/90

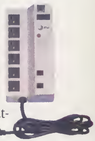
CIRCLE 111 ON READER SERVICE CARD



© 1990 AT&T

Real-World Protection.

In this far from perfect world, not every surge-suppressing device gives you the protection you need from electrical power line distortions. The surges and "spikes" that can destroy or shorten the life of your high-tech equipment. That's why an AT&T Surge Suppressor is a low-cost investment in complete protection. Because only AT&T gives you solid-state architecture, AT&T Bell Laboratories engineering, UL-approved circuitry, and a thermal cut-off feature to disconnect power before it becomes hazardous. Plus the reliability assurance of the company with a century of experience in AC and telephone line protection. For the location of your nearest AT&T dealer, just call 1 800 638-7978.



AT&T
Network Systems